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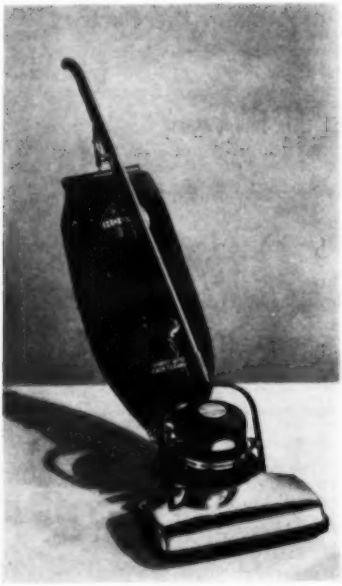

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Lacquers vs. Synthetics

by Jeffrey R. Stewart
Research Chemist*

Obviously the matter taken up by the author of this article is somewhat controversial in character . . . just as "Varnish versus Lacquer" was a delicate subject to deal with 10 or 12 years ago. However, facts about the modern synthetic finishes are timely . . . and much in demand. Comments or constructive criticisms on this article will be welcome.

DURING the past three years has occurred something of a revolution in methods of industrial finishing, especially in the automotive, refrigeration and furniture industries. After lacquers were firmly established in spray rooms, it was predicted that they would never be replaced with competitive materials, since they seemed to possess all of the most desirable properties.

It was not long, however, before synthetic resin enamels (especially the alkyds** or glycerol phthalate resin enamels) were introduced to the public through the trade sales market. They were recommended for use as house paints especially for frame structures. Unfortunately, however, these alkyd enamels ultimately did not prove satisfactory. Even the manufacturers were willing to admit that such products were not a success . . . . at least for the purpose for which they were being used at the time. The greatest disadvantage of synthetic enamels on wood was their inability to allow "breathing." The dried film was lacking in porosity, and the consequent impervious nature was the cause of blistering and other failures. As a result, we no longer find this type of house paint on the shelves of paint and hardware stores.

Synthetics on Metal

Almost simultaneously, paint manufacturers applied their forces towards investigating the use of synthetics to partly replace nitrocellulose lacquers or to be used in combination with them. This experiment has met with considerable success. To meet the demands of various formulations, four general types of alkyds for varnishes and lacquers have been adopted:

1) Phenolic modified alkyds,
2) Straight or unmodified alkyds,
3) Natural resin modified alkyds,
4) Phenolic modified, oil-extended alkyds.

Since there are over 250 synthetic resins now commercially

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**A condensation product of phthalic anhydride, usually plasticized with fatty acids from various vegetable oils.

available, it is not difficult to conceive the multitude of combinations which might be possible to obtain certain desirable properties. For instance, the writer is now investigating the compatability and efficiency of alkyd and phenolic resins modified with ester gums and other synthetic resins and fossil gums. With this extensive list of raw materials and their combinations, it is little wonder that many, if not the majority, of the large industrial finishers are changing from lacquers to synthetics. Henry Ford† and the Chrysler Corporation are among the leaders in this revolution.

The writer has carefully noted the situation, and feels the following constitutes an unbiased opinion of synthetics as compared against nitrocellulose lacquers.

Advantages

1) Increased flexibility and exterior durability (weather resistance).

2) Decreased explosion and fire hazard.

3) Thicker film as a result of higher non-volatile content for a given viscosity.

4) Better gloss retention.

5) Better adherence to metals without the use of primers or surfacers.

6) Toughness of film, and unusual resistance to abrasion.

7) Ease of application, especially with the brush.

8) Percentage of pigment by volume has little effect upon durability.

Disadvantages

1) Inability to rub down with compounds to give a rich appearance, commonly called "depth of finish."

2) Difficulty of obtaining a film lacking orange peel appearance.

3) Difficulty of touching-up local parts which may have been damaged or marred.

4) Inability to adhere to wood unless thoroughly seasoned.

5) Slower drying time than lacquers.

Drying Time

Notation has been made under disadvantages, that the drying time of synthetics is greater than lacquers. Strictly speaking, however, when all factors are compared, it is possible that this may not be considered a serious handicap. For instance, when a lacquer leaves the spray gun, it may contain from 10% to 20% of film-forming ingredients, or what the formulating chemist would call "non-volatile content" or "total solids." In the case of synthetics, this important factor may be increased by 100% or more, with a resultant film-forming percentage of from 20% to 40%.

The film thickness, then, with a synthetic would be approximately doubled. It is obvious then, that it would be necessary to apply two or three coats of lacquer to obtain a comparable thickness. This is in addition to the priming or surfacing coats which would be much more important with lacquer spraying, enabling the lacquer to adhere to the metal surface. Thus it may be possible to finish an object in less gross time with the slower-drying material, than it would be with a rapidly-hardening coating such as the modern nitrocellulose lacquers.

Depth of Finish

Generally speaking, the public does not feel that an improvement has been made by synthetics insofar as appearance of the dried film is concerned. Lacquer coatings (especially on automobiles) have a smooth and rich depth of finish which has not yet been par-

†See "Ford's Experience with Alkyd Resin Enamels," Iron Age, 134, No. 5, 24-5, 78 (1934).

alleled by any competitive materials. When we say "depth of finish," it is very difficult to give even a technical explanation of what we mean. Even authorities on the subject have a difficult time trying to define this valuable characteristic, and it has been equally difficult to decide what raw materials or method of application will aid in obtaining this optical sensation.

What we do know, is that a professionally lacquered object polished with rubbing compounds, presents a very pleasing appearance. A similar effect is obtained on furniture which has been coated with . . . . let us say . . . . 10 or more coats of a high grade rubbing varnish, each coat being sandwiched with a treatment of mild abrasion or rubbing, using such agents as rottenstone, pumice or silica in oil. True it is that very little furniture is now being refinished in such a manner since the advent of semi-gloss furniture lacquers. By the use of metallic soaps, the formulator has been somewhat successful in his attempts to imitate the hand-rubbed varnishes . . . . in fact so successful that the average laymen cannot detect the difference.

In the writer's opinion, the most important factors that contribute to this desirable "depth of finish" are listed as follows:

1) Thickness of film.
2) Smoothness of film or leveling characteristics of material used.
3) Application of rubbing compounds.
4) Degree of gloss.
5) Number of coats.
6) Color.
7) Age of dried film.
8) Proper balancing of flattening agents such as metallic soaps.

Since numbers 1, 4, 5, 6, 7 and 8 may be obtained from any coating regardless of type, it is possible (by the process of elimination) to state that numbers 2 and 3 are, by far, the most important factors involved. In order then, that the paint chemist may formulate the most suitable product for the spray foreman, it is most important that the problem be attacked by trying to improve the leveling characteristics and by devising a means whereby the coating can be made sufficiently hard so that it may be rubbed with the usual compounds.

Orange-Peel Effects Leveling Characteristics

Orange-peel difficulty is to the sprayman as brush marks are to the house painter. In spray lacquers, the difficulty can be largely overcome by re-balancing the thinner portion, i. e. by using such solvents as cellosolve which has a high solvent power and a slow evaporation rate. Then in house paints, it is almost entirely possible to eliminate brush marks by the addition of a small percentage of bodied or specially heat-treated oils. But in synthetic resin enamels (especially alkyds), the problem of improving leveling is not so simple, and has not yet been completely solved . . . . that is . . . . if we are to allow this condition to be manifested in some of the lower priced 1936 automobiles.

The degree of leveling is dependent upon the consistency characteristics of the material. The more truly viscious the product is, the better the leveling; the more plastic, the poorer the leveling. It would be understood then, without further study, that it is necessary to add thinners or vehicles which will tend to break down or destroy the yield value

which is ever present to some extent in pigmented or plastic materials.

The ideal thinner for alkyds is toluol or its homologues, but due to the lack of availability with consequent high cost, this coal-tar hydrocarbon is rapidly being replaced by high-solvency naphthas derived from petroleum fractionation, cracking, hydrogenation, polymerization and selective solvent extraction. It appears that the leveling of synthetics has been improved by the use of such solvents, because the petroleum refiner has placed at the disposal of the formulator the ability to govern the evaporation rate within extended limits.

Derivation of Modern High-Solvency Thinners

The industrial finisher should acquaint himself with the fact that there are four basic methods now being used to obtain the petroleum thinners which are finding their way into the formulation of synthetics. These methods are:

1) The cracking process (pyrogenic decomposition method).
2) The solvent extraction method.
3) The hydrogenation process.
4) A combination of any of the above methods.

For a more detailed discussion of the above methods, the reader is referred to S. S. Circular No. 494, of the National Paint, Varnish and Lacquer Association.

The Relation of Thinners to Leveling

With the tremendous tools of science and industry now being applied on a commercial scale, many of the problems of both the manufacturer and the consumer have automatically solved themselves, at least insofar as the leveling of synthetics is concerned. For instance, improved leveling may be obtained by employing some of the thinners produced by some of the above methods. These liquids seem to exert a better wetting action (improved dispersion) with a resultant decrease in the consistency and a destruction of the yield value. Thus, when we reduce the body of the spraying medium without proportionally decreasing the non-volatile content, it is obvious that better leveling results without sacrifice of the desirable thickness of film. The same condition exists with regard to lacquer thinners, although this requires a much more involved and extensive study.

Shop-made Thinner Formulas

Superintendents and foremen in industrial spray shops rarely attempt to formulate a properly balanced thinner for use in lacquer reduction, because it sometimes involves the use of as many as ten or more various ingredients. On the other hand, when dealing with synthetics, it may be possible to select their own thinners, since such liquids rarely are composed of more than one or two liquids . . . . three at the most. Thus the hazard which accompanies shop-made formulas is reduced to a minimum . . . . not necessarily the hazard of fire and explosion, but the danger which usually develops in regard to compatability or miscibility when mixed in the spraying medium.

It is, of course, preferable to obtain thinners for any base material (regardless of simplicity of formula) direct from the manufacturer of the lacquer or synthetic resin enamel. The reason for this suggestion is to facilitate the solving of complaints which

(Continued on page 59)

Color, Decoration, Design

as it applies particularly to latest modern furniture

by M. Languis

TODAY WE are in a colorful age. Interior decorators, designers, writers and illustrators have helped to bring this about through their work in numerous publications. Motion pictures have exerted considerable influence along this line, as did the Century of Progress in Chicago.

The question may be asked, "What is genuine beauty and good design in furniture?" The answer is much simpler than you may expect. A well designed piece of furniture is one that fulfills its utilitarian demands, affords aesthetic pleasure to the beholder, and expresses the taste and culture of the time when it was built.

Each period, by reason of its historical background, its supply or lack of outstanding designers and craftsmen, and the artistic aptitude of the leaders and their necessary patronage, has produced certain peculiar characteristics which we call style.

Combinations of Color

Color and Modern style are inseparably associated in the furniture fashion of today. Popular colors include resin brown, cocoa or chocolate brown, camel or rather beige (which is a light grayish tan), and cadet blue (light blue with a gray cast). Pastel shades vie with brighter tones for popularity and are preferred by many buyers. Copper is a poular new shade; also coral and deep blue; these are especially popular and beautiful when used in combination with chalk or bone white finishes.

Beautiful Glass Tops

Walnut, mahogany and maple (stained and glazed), plus an association with the many beautiful veneers now available, are extremely attractive. Cocktail tables have brought about the more extensive use of beautiful decorated glass tops with a modern treatment. All colors are used—for example, mirror borders with black, gun metal, white, coral, yellow and blue. These colors are produced by spraying lacquer enamels on the back of the glass. In addition to clear glass with and without etched designs, there are tinted glass tops in coppertone, gold and blue.

Color is an important accessory to many of the latest combination finishes. An interesting trend of the day, as evidenced in furniture show centers, is the fine natural color and bleached wood combina-

tions now employed to lend beauty to furniture, both in large and small pieces. Many new woods are being employed today in modern arrangements which will introduce a new basis of beauty to the American home. Walnut, mahogany, maple, satinwood, and avodire, with metal chrome trimmings, bandings, and tubings are very good in the modern type furniture.

Table in Bone White Decorations, Black and Gold

Let us refer to the accompanying cuts by which we can illustrate some of the color combinations mentioned. We will finish table No. 1 in bone white.

The piece comes to us in maple or birch. We spray on a coat of sealer, and give it plenty time to dry so that when sanded we have a very smooth surface. Then spray on a thin coat of white. This is followed by a heavier coat of the same material after the first white coat is dry.

Be sure and strain all material used, and keep all equipment clean. This will give a very smooth job which, when finished, will require no rubbing.

Our next step is to decorate it, using black and gold. Let me say at this time that decorations of this conventional type should be applied with slow-drying or brushing lacquers. Bronze, in order to hold its color or original luster, should be applied with lacquer. This must be slow-drying, so it can be laid on with a brush or striping tool. I generally use a high-gloss heavy-body lacquer, and thin it about 50/50, and add a little retarder.

Our next step is to antique or glaze the piece. Glaze can be bought in all shades at all finishing houses. I suggest a Van Dyke brown shade for bone white, and burnt umber for a parchment cast. Apply the glaze very thin with a spray gun; "smoke it on," and around the carvings apply it a little heavier. Wipe the surfaces almost clean with a soft cloth; then highlight with very fine steelwool, bringing to view the original white. Before the last coat of semi-flat lacquer is applied, blow off all particles of steelwool with air. No rubbing is required.

Table No. 1—Neo Classic

Stencils and Striping Tool

This piece also has decorations which can best be applied with masking patterns or

stencils cut from show card paper. We use an airbrush and striping tool for all of this decorative work. On this one piece there are no fewer than 52 places where decorations including striping are applied. This is done at a cost of approximately 20c per piece. Being a decorator for a good many years and having done all types of decoration, I know I am safe in saying that should this piece be done by hand, it would take almost an hour to decorate at a cost of 60c. The new striping tools on the market are absolutely wonderful. They give perfect lines with uniformity.

The top of this piece receives the etched glass top in its many colors . . . which make it a beautiful number.

Also in Mahogany or Walnut

Now let us take this same piece in a stain finish—say mahogany or walnut. Modern pieces that have fine veneers should be given a very clear and transparent finish. Do not use a glaze over the entire piece.

Mahogany starts with a brown mahogany stain; walnut, with a very light stain—just enough to give uniformity. The stained surface should be allowed to dry thoroughly before sanding. Then filler is applied, which is our next step. Now we apply a coat of sealer. This is sanded and one coat of lacquer is then applied.

Tables No. 2 and No. 3. Glass-top coffee tables Photographs, courtesy of Allegan Furn. Mfg. Co.

Now we are ready to decorate.

Ornamentation should be in brownish gold, which is made by adding burnt umber to a gold mixture. Stripes, either in gold or ivory, are good. They should be very fine, say 1/16-in. wide, done with a mechanical striper. We now glaze the decorations and their immediate vicinity to give an elementary relationship—a mellowing decoration that blends into the piece proper.

Finishing and Decorating Tables No. 2 and No. 3

Table No. 2, as it appears in the illustration, is in bone white, with the top rim and feet in mahogany. Other finishes and color decorations can be worked out equally as well, just so the color scheme is properly balanced. This same piece can be finished in chocolate brown, as follows: To begin, seal and sand. Cover the entire piece with one coat of chocolate brown lacquer enamel, which is a little darker than burnt umber. Now with an airbrush and low pressure, about 35-lbs., and using the material a little thinner than was used in the larger type gun, spray the turnings up to the first members, top and bottom, with camel or light beige which is a light grayish tan. Paint the short distance between the top and bottom members of turnings in gold. This does away with the ragged or blurred edge left by the airbrush spray.

Decorations should be in brown gold and beige; stripes also brown gold. Glaze with burnt umber over decorations and turnings, if you prefer. Apply one coat of lacquer over entire piece. I would suggest the top be a panel of ¼-in. thickness covered in embossed imitation pig skin (a dark shade of cream) instead of glass. This same piece can be worked out in black and white, with black predominating. Decorations can be in gold and white, with a white leather top.

Table No. 3 is finished in bone white, with a mahogany framed tray and decorations in gold. This same piece is very good looking in a bone-finished base and tray, with a satin wood top. Decorations would be the same on the base. The top would receive two brown stripes about 1½-in. from edge, ¼-in. apart, running the full length of top only. A good substitution for satinwood, and nice looking, would be walnut or mahogany, striping the top with gold.

Another suggested color scheme is to finish table No. 2 in bone white, as shown in the illustration, but color the feet and top in deep blue, almost Prussian, with decorations in gold and deep blue, and stripes in gold, with glass or leather top in cadet blue. Other pieces could be finished in bone white with fine stripes in gold and coral, with gold tone and transparent glass tops.

New modern pieces in walnut, with lots of wood surface in fancy veneers, should be kept very clear as to the finish. Bands and inlays or tubular moldings in chromium are very new.

More About Stencils

All Modern and much of the Neo-Classic will receive stripes. These can be applied very neatly and quickly with a mechanical striper. Conventional ornamental designs and borders for drawers, doors, and the flat surfaces of posts and stretchers can be ap-

plied with stencils. These stencils can be cut from show card paper and, if properly taken care of, they will last a long time. They can be easily washed. I have used a paper stencil as many as 1,000 times. The secret of using a paper stencil is that the instant a low pressure of air hits same, it lays down flat and close to the surface being worked on.

The way I spray a paper stencil is first to weight down the stencil to keep it in place; then I hold the airbrush in one hand and lead with the finger of my other hand about ½-in. ahead of the spray. This is to hold down the pattern in direct vicinity of spray. For stripes I lead with one finger on each side of the stripe to hold down the pattern as I move along. I have used this type of decoration for a number of years; when accustomed to it, one will find it very swift and neat in application. Cutting the stencils is a matter of practice and knowledge of design.

F. S. Magnus of Maas & Waldstein Died Feb. 16

The many friends of Frederick S. Magnus, vice president and treasurer of Maas and Waldstein Co., Inc., Newark, N. J., will regret to learn that on February 16 he died of heart failure after an illness of several months. Mr. Magnus, who was 66 years old, came to this country from England a half century ago. He joined the Maas and Waldstein organization in 1911, and in 1914 was made vice president and treasurer.

Always active in the management of his own company, Mr. Magnus became a prominent figure in the American lacquer industry, where he gained widespread recognition for his high ideals of business ethics and his great practical knowledge. His opinion and advice were constantly sought by the industry.

An excellent example of the 1936 improved Modern style in really useful furniture for the home . . . attractive simplicity and refinement that will endure . . . easy to keep clean and sanitary. Called the "Ash Group" because of the use of beautifully-figured, light-colored ash veneers finished natural and outlined in a darker color at the edges, it deserves a prettier name. This group attracted favorable comment at the January Furniture Show in Chicago. It is a product of the North Star Furniture Corporation, designers and manufacturers, Evansville, Indiana.

Two different patterns of shrivel finish.

Practical facts about several types and designs of shrivel or wrinkle finishes; just what oven temperatures and procedure to use; notes on how these finishes affect product design and volume sales. Also a few practical facts about crystal finishes.

by C. L. Nagel

Shrivel or Wrinkle Finish

(And Crystallizing Finish, Too)

SHRIVEL FINISH is a popular surface coating adaptable to many products. Everyone has seen articles finished in this interesting coat. Perhaps he has called it by some other descriptive name such as "fingerprint," "ripple," or "wrinkle."

Doubtless you have observed that there are two accepted types. The first generally shows a medium luster and has parallel rows of crooked hills or raised lines arranged around shiny spots. The size and brilliance and prominence of these interspersed shiny valleys is not the same in all colors, and is not so noticeable in black as in other colors. As this type of shrivel requires only the moderate temperature of 150°F. for formation, and has toughness and hardness of a high degree, it is useful for many materials, products and shops.

The second or "regular" type of shrivel is so similar that many persons have never noticed the difference. Close scrutiny, however, discloses that it generally has a higher gloss, is entirely without shiny valleys and it is oriented: This orientation or directional effect in regular shrivel is apparently due to gravitation which causes the shrivel lines on vertical

surfaces to be somewhat more inclined in an up-and-down direction. This uptodate shrivel is comparatively free from the tendency to develop little sags all over the surface. That tendency used to be somewhat common, as was also the tendency to show pronounced "sunrays" around projections and holes.

Not Fussy or Tricky to Use

Regular shrivel is dear to the hearts of many busy paint-shop bosses because it works under divergent conditions of temperature, humidity and film thickness. For instance, it may be put into the oven right after spraying, or it may be left out several hours. It is not fussy or tricky; it may be baked so hard that it will stand assembly and packing and a lot of abuse. There is probably only one other novelty finish that gets away with more banging — and that is "crystal." Regular shrivel may be formed at temperatures from 200° to 250°F.

There is still a third type of similar finish occasionally encountered—a so-called "air-dry" type. Actually, while the puckering can be made to take place in a warm room, yet this type must be put into an oven afterward to make it tough. Most users prefer to have the shriveling and hardening both take place at the same time in the oven . . . . in one operation.

Crystallising Finish

In this discussion of novelty oil-varnish coatings, even though it is dedicated to the shrivel type of effect, it would not do to pass without mentioning the good old crystal finish. Developed for the U. S. Navy after the big war, its advantages were soon recognized by industrial users—one of the first having been a Western producer of a loudspeaker horn for radios. These horns were shipped all over the country by the thousands, and soon "crystal" was a topic of interesting discussion. (One Chicago manufacturer scraped the labels from all of his cans of crystal finishing material so that his finishers could not give out information.) But the identity of the pioneer paint house soon became known to the trade. In the years since then, crystal has enjoyed recurring waves of popularity while other novelty finishes have come and gone.

To set down what every finish expert knows, here is the way to "crystallize": The oven may be of the simple direct-heat type; if it is not, then you can convert it into that type by putting a small burner right in the baking compartment. Close all dampers and vents. Put in the freshly sprayed parts. In 15 to 45 minutes the crystals will be perfectly formed. Then open the ventilators, increase the temperature to 200°F. or more, and bake the coating hard.

When the crystal coating has cooled, inspect it. Give it the old thumb nail test, pressing down hard. Then, with a hammer, actually nick it. Such abuse causes damage, of course; but the light dispersing, scintillating appearance of a properly executed crystal job disguises defects which, with an ordinary smooth coating, would require a refinish operation.

Oven Technique

For shrivel materials the procedure is somewhat different. Go

back to your indirect-heat oven, as it was at first. Open the ventilators, bring up the temperature and put in the sprayed job. Soon it is shriveled all over. Leave it in the heat till it acquires the hardness you desire.

Even if you have only ovens of the direct-heat kind, it is possible to produce shrivel successfully. In this case I suggest that you use the regular shrivel and not the 150°F. type. While the latter, the "bright spot, dull luster" variety can be used, it is more susceptible to oven atmosphere conditions and requires an understanding of shriveling technique that is beyond the scope of this article.

Merits of Shrivel Finish

Every finisher should know about these materials. They can be used for hiding a multitude of surface blemishes, and they give pleasing results, even in shops that are too dusty for other finishes. Stampings sometimes have die-marks, wrinkles, rough joints and weld-spots. Castings are rough—even the smoothest castings—and they have sand holes. Actually, to eliminate all such surface defects would require soldering, welding, grinding, filling and sanding operations that are costly and time-consuming. In addition, the thicker the coating surface built up on this metal the more vulnerable it is to nicking, chipping, scratching and cracking.

Shrivel, because in most cases it is a one-coat finish and a tough material, is not so vulnerable; it stands a lot of flexing, expansion and bumping. And this material sticks to all metal, wood, composition, plastic and synthetic surfaces, even though they are not chemically clean. Actually a quick, cursory clean-off is all that is necessary.

In these days of advanced product design and art in engineering there is a further advantage in the use of shrivel. It serves to unify the different kinds of surfaces on a single product. Here is an example: A mechanical apparatus about the size of a coal stoker, is made of rough cast iron, smoothly machined parts, die-cast alloy and sheet steel. To make the rough cast iron, when finished with ordinary smooth paints or lacquers, look like the machined parts would entail an expense that would be out of the question, and to hide the ugly joints, welding and dents of the sheet metal would likewise be impractical. And yet, to finish the product without doing these things would serve to emphasize its appearance as a "contraption of assembled parts." When such a product is shown to the prospective customer, its assembled appearance tempts him to question or wrangle about mechanical details and other debatable subjects which otherwise might not even occur to him.

But let us send this useful mechanical servant to the shrivel finish laboratory. Now, when we get it back what do we see? A compact device, obviously well designed and built for a definite function — unified, pleasing, impressive, confidence-inspiring—it sells itself. Actually that is the way it works out.

To sum up: Shrivel offers you a one-coat finish that sticks, that stands water, oil and outdoor exposure; that resists wear and abuse; that is low in production cost; the finish without rejects.

Finishing Modern Furniture

by Ben J. Studer

THE EDITOR asked me to write an article on the above subject—"something on problems found and solved in connection with finishing veneered surfaces." He called my attention to "some beautifully veneered furniture and radio cabinets having a full-depth, lustrous, transparent finish, rubbed to a rich sheen," and wanted me to "tell how it's obtained — what's required from start to finish, etc." Well, I'm writing this article strictly from my own personal experience in uptodate furniture factories.

Before planning or starting the finishing of a run of furniture through the factory, the foreman finisher should first take into consideration the different kinds of veneer, of which there are many now used in furniture and fine cabinet work. There are veneers with closed pores, veneers with medium size pores, and veneers that have large pores—the latter being more difficult to finish. One must be careful in filling the different kinds of wood. Some foremen give these open-pore woods what might be termed an "open-pore finish," due to the fact that a "filled-pore finish" is a little more difficult, takes more time and material, and of course costs more money. But I never found open-pore woods hard to finish provided the proper materials and methods were correctly used.

Consider the character of veneers and wood to be finished, and plan the finish accordingly. Notes on wood product finishing operations, including the finishing of new drawer interiors, turnings, carvings, and inlays.

The first thing to do is to see that the wood in the white is sanded smoothly when it enters the finishing room. To get a real good job the finisher may have to hand sand it still more with No. 4/0 finishing sandpaper, sanding with the grain always. "Cross sanding" (across the grain) will show up on the finish later on.

After the surface has been carefully hand sanded and the dust blown off, it is ready to stain. This should be done right after the sanding. If the sanded furniture is allowed to stand for a few days, some of the tiny fibers will again rise, making the surface rough so it will require another sanding.

In staining, the stain should be put on as quickly as possible—with long even strokes if brushed on. I prefer to put it on with a spray gun. After the stain has been applied it must be allowed

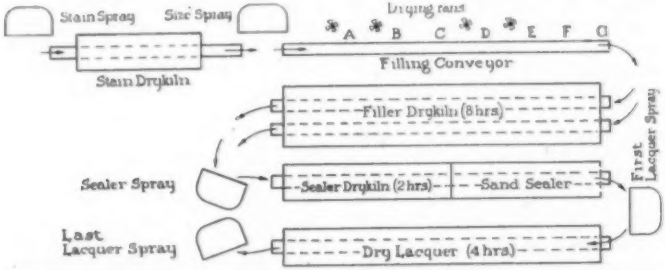
to dry thoroughly. Next, the veneered surface should be sized. I generally use a shellac size made by thinning white or orange shellac with alcohol, in the proportion of six parts alcohol to one part of liquid shellac. Let this stand for about half an hour and then sand lightly with No. 4/0 sandpaper.

Filling After Staining

Now the surface is ready to be filled, which is an important part of the finishing process. I always use a good silex filler made up in the proportion of 14-lbs. of paste to one gallon of naphtha or high grade gasoline. Filler should be put on with a brush, first brushing it across the grain and then laying it out with the grain. This heavy coating of filler should be left on until it shows a dead appearance. A good way to test this, to see if it is dry enough, is to place your finger on it and press pretty hard; draw it across the grain; if your finger remains clean, the filler is dry enough to be "towed off." The "towing" should be done across the grain always. After this, the filled surface should be carefully "ragged" off with the grain, using a soft, clean cloth.

Let the filler dry over night before the sealer coat is put on, unless there is a drykiln available. A good coat of sealer should be put on, or a good coat of shellac, for the first coat. After this is dry, sand lightly, dust off, and give the surface two coats of lacquer, allowing 36 hours for the lacquer to dry before rubbing.

The schedule of operations just outlined will give you an excellent finish. A filled job is much better than the "open-pore finish" because it always brings out the beauty of the wood. The "open-pore finish" generally has a dead appearance and looks shallow, whereas the filled job gives that



This drawing shows an approximate floor plan layout of production equipment, drying compartments and conveyor lines in the finishing department of a plant manufacturing tables and novelty furniture.

Stations along the filling conveyor, following the booth for spraying size, are: A, fans to dry size; B, sand the sizing coat; C, brush on filler; D, fans to dry filler; E, tow off filler; F, wipe filler with soft rag; G, inspect.

The dry kilns for drying stain, filler and sealer each have curtains at both ends. Temperature in the stain and filler drykilns is 110°F.; in the sealer drykiln, 100°F.; and in the lacquer drying room, 90°F. Relative humidity in each of the four drying compartments is 42%.

Passage of work through the stain drykiln requires two hours; through the filler drykiln, eight hours; through the sealer drykiln, two hours; and through the lacquer drying compartment, four hours.

depth and luster that people admire. An open-pore finish, however, is all right in its place.

The more close-grained veneers may also be finished in the same manner, only you don't use quite as heavy a mixture of filler—say about 8 or 10-lbs. of paste filler would be enough to a gallon of solvent.

Finishing Drawer Interiors

For an attractive and durable drawer finish, I like to use one coat of orange shellac, then sand lightly and apply one coat of flat lacquer. This gives you a drawer interior that you never need be ashamed of. There is a drawer wax that some concerns use as a one-coat drawer finish, but did you ever look at one of these drawers about six months after the wax had been put on? Well, you wouldn't know that it was ever waxed. Take a white piece of cloth and wipe the inside of the drawer. Note how the wax rubs off, leaving only the bare wood. A lacquered drawer always looks good—and a satisfied customer is something to be proud of.

Finishing Carvings; Turnings

Carvings should be finished with a shading stain. The stain is put on and then quickly wiped off from the high parts, leaving the low places dark and the high places light in color. Another way is to spray the shading stain all over the carvings and then use a little steelwool to rub the high places. But when using steelwool be sure to blow the waste particles out of the carving with an air duster.

A good way to finish furniture turnings is to begin by dipping them into a pigment stain. After the stain is dry, apply one coat of sealer, followed by two coats of lacquer or varnish—with suitable drying periods after each application of material. Turnings should be finished with flat lacquer or flat varnish in the last coat.

If turnings do not finish very good at the end wood, give the end wood two coats of sealer. This can be done with a brush after they are sanded, or with a spray gun; but the sander can do it with a brush at very little cost.

Finishing Inlays

Inlays should always be finished in their natural color. Apply a coat of white shellac to the inlays before staining the furniture on which they are used; then proceed with the finish in the regular way.

Reflects Heat

To emphasize the remarkable power of reflection of a sheet of alfol (aluminum foil) the Alfol Insulation Co., Inc., Chrysler Building, New York, N. Y., has prepared and is sending out a 9x11½-in. bulletin in red and black which is backed up with a shiny sheet of alfol. You are invited to hold it close to your face and feel the reflecting heat. Panels of this alfol are made to be installed back of radiators to reflect the heat outward. Alfol is suggested for many useful purposes.

Industrial Ovens; Dryers Gehnrich Catalog

Catalog No. 101, copyrighted in 1935 by The Gehnrich Corp., Long Island City, N. Y., contains 28 pages 8½x11-in. inside heavy paper covers. The contents include interesting information, data and numerous illustrations dealing with the company's various types and sizes of ovens and dryers for service in all kinds of industries. Every user or prospective user of ovens should have a copy. Copies will be sent free to business firms.

» » To Make Paint Stick to Cadmium-Plated Steel

by George A. Endom

Solution of this difficult problem was finally effected by employing suitable materials and methods to clean all the cadmium plated surfaces of an invisible residue that caused the paint to flake off after it became dry.

WHILE MANY manufacturers and most finishers believe that any plated steel is amply protected from corrosion by the plating metals, and is painted only to conform to the color scheme of adjacent surfaces, it is nevertheless a fact that in numerous cases cadmium plated parts should be painted. However, it is almost impossible to get lacquer enamels or even oil-base enamels to adhere properly to this plated surface. Flaking appears soon after the finish is thoroughly dry, usually occurring at joints, welds and crevices. The use of thin coats alone will not eliminate the trouble.

Attempts have been made to roughen the plated surface by experimenting and changing the plating solutions, but this has usually resulted in either spoiling the cadmium coating or pitting the plated surface so badly that a pinhole or "sandpaper" finish was obtained.

Next, on the assumption that the surface needed further cleaning, a chromate acid bath was used, followed by a hot water immersion. This was unsatisfactory. Cadmium plated parts were baked thoroughly, in the belief that slight moisture in crevices was the cause of poor adhesion.

Having become convinced that all these methods were unsuccessful in giving a smooth durable finish, I found that the trouble seemed to be caused by something in the plating surface itself. Evidently some action of the atmosphere on the cadmium plate was creating a condition harmful to adhesion.

Further experiments disclosed the fact that regardless of how much care was exercised in washing the finished plate, a chemical residue remained, especially in joints and crevices. It could hardly be detected. This residue settled in the pores of the surface; became a part of the plating itself; washing with chromate acid solutions or water alone did not remove it as these liquids do not attack the surface.

Eventually I discovered by accident that all these surfaces

seemed to have a salty taste and if this seemingly salty residue were removed, the finish, if properly applied, would adhere satisfactorily to smooth cadmium plate. The removal of this salty residue presented quite a problem. If washing would not accomplish this, it appeared obvious that a chemical remover capable of slightly etching the surface, but not strong enough to injure the coat of plate, must be used.

Method Used to Overcome Flaking

One of the reasons why cadmium-plated surfaces should have the additional protection of paint is that the deposit of plating material is apt to be thinner or thicker in different places on the same surface. (This has been discovered when stripping off the thin film of plating.) To those sections that have a thinner coating of plate, the paint acts as an added safeguard to the base, especially in salt air localities. So the cleaner used to remove all traces of residue left by plating should not have a deleterious effect on the plated surface. After eliminating various cleaners, I chose four and arrived at the following conclusions by these methods:

Results of Tests

On 16 sample pieces plated, (eight pieces of 1-in. diameter tubing and eight pieces of flat metal with a weld in the center of each) four pieces were given a chromate acid bath, while the remaining four pieces were merely given a hot water bath after removal from plating solution.

Two pieces of tubing and two pieces of welded stock were cleaned with the following cleaners: "A," acetone; "B," an industrial cleaner; "C," acetic acid, 2% solution; "D," the chemical cleaners mentioned in a previous article appearing in INDUSTRIAL FINISHING Magazine.

These experiments were repeated several times, using different coating materials of well known manufacturers. Some finishes were allowed to air-dry; others were baked and were then exposed to sun and salt-air for periods varying from one to six months. These pieces were then subjected to the following tests:

The tubing was crushed in a vise; the flat stock was bent and hammered. All pieces were given a triangular scratch through the finish to the plated surface to see if any corner of the triangular scratch could be lifted to start flaking off. (At the plant where these experiments were conducted this was the senior resident inspector's favorite test for poor adhesion.)

Cleaner "A," acetone, and the industrial cleaner "B" were not as efficacious as acetic acid "C," and the industrial cleaner "D" mentioned in the previous article. Those parts subjected to the chromate acid bath were found to have poorer paint adhesion (even after chemical cleaning) than those which were only immersed in hot water after removal from the plating solution. So the chromate acid bath was discontinued.

During these experiments the question arose as to whether this cleaning had a harmful effect on the cadmium plate. Cadmium-plated sample pieces fresh from plate and cleaned by the wet chemical cleaner or by the acetic acid solution were stripped of

plate. The difference in thickness if any, was so slight as to be negligible.

Several years have elapsed since I conducted these experiments, but I still use this chemical cleaner or acetic acid solution. Then I wash the parts in cold water and either bake or air-dry them. After this treatment I find that any primer—oil, pyroxylin or synthetic base—will cling tenaciously to any cadmium-plated surfaces, provided a little care is exercised.

The slight expense added to the cost of cleaning and painting this class of work in this manner amply repays any manufacturer, not only in the finishing troubles thereby eliminated but in the reputation he gains for his more durable finishes.

Copper Paint

THE NEW copper-powder finishes, wherein practically pure leaf copper is used instead of the powders or fine flakes of other metals, have become interesting to a number of users of finishing materials. In order to supply some quick practical facts about what appears to be a very fine quality of copper powders, the following short article has been prepared from data published in the manufacturer's booklet to the trade.

True leaf copper or bronze powders are made from 99.8% pure copper and are minus 200 mesh in fineness. From 2 to 2½-lbs. of powder per gallon of paint is sufficient to obtain complete one-coat coverage. Due to the leaf-like characteristic of the particles, they remain in suspension in the carrying vehicle for a long time. After settling to the bottom of the container, they can be easily re-mixed.

To make comparisons of different brands of copper paints it is suggested that a microscope be employed to examine the dry powders. Then try mixing equal portions of each different brands with a suitable quantity of vehicle, using the same kind of vehicle for each brand of copper powder. Mix in the proportion of 2½-lbs. of dry powder to a gallon of vehicle. Use a spray gun or brush and apply a one-coat covering on sample test panels. Compare the coverage, appearance and hiding power of the different brands of copper paint, using a microscope for examining the appearance and hiding power of the different coatings.

In addition to pure copper powders, copper alloy powders of various colors are produced. By the addition of other metals to copper in the proper proportion, the shape of the metallic crystals is changed, thereby reflecting a different color to the eye. For example, gray, violet, green and yellow copper alloy powders are made. It requires 3-lbs. of these copper alloy powders to the gallon of vehicle to obtain a coverage equivalent to 2½-lbs. of pure copper powder.

The best all-around vehicle for these copper and copper alloy finishes is a long-oil varnish made from heat-treated drying oils and synthetic resins. It is important that the varnish be completely neutralized; otherwise a chemical reaction on the copper pigment will result. The varnish should be sufficiently elastic to compensate for the expansion and con-

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traction of the surfaces to which it is applied.

These copper paints can be supplied in ready-mixed form, or the powder and vehicle can be obtained separately to be mixed only when used. The copper powders referred to here can be used with various lacquer vehicles also, but the powder and vehicles should be obtained separately and mixed only when used.

Copper paint, used as a prime coat on iron or steel is an excellent protection against corrosion. The copper pigment adheres to the metal and permeates its pores. In case of a fracture of the paint film, the copper pigment effectively seals the edges of the fracture with a patina and prevents rust from creeping under the film. This patina action is a protective feature distinctive to copper, which gives copper its permanency and its right to the name, the "Everlasting Metal."

Copper paint, used as a prime coat on wood, effectively seals the surface and prevents changes in moisture content. It is often used for painting the bottoms of both wood and metal boats. Copper paint can also be used as a covering for cement floors.

Air Tank Explosions

The causes of air tank explosions are somewhat in doubt. However I am passing along what I believe, through inquiry from practical engineering sources as well from actual observation myself, to be the most logical explanation possible. I am also including a few suggestions along the line of safety in operation of the compressor and air tank.

In the interior of an air tank that has been in service for some time, you usually find a coating of oil and grease which, in turn, makes a condition somewhat in the nature of a hard carbon deposit. Naturally, any excess friction by excessively compressed air constantly in motion, causes this carbonized deposit to heat, and when it gets to a point of "firing," it can easily explode the air, causing such a degree of expansion of the contents that the tank will be forcibly torn open; and the most likely explanation possible of why the air container is usually drawn inwards, instead of having its walls bulged out, is that the force of vacuum through the sudden discharge of contents causes the condition indicated.

I believe that it is in line with safety to see that the air tank is frequently cleaned by blowing out accumulations of water and oil. This will tend to reduce the possibility of carbon deposits to a great extent, to say nothing of better preparation of the air for daily use.

Strict attention to the automatic unloader on the compressor, cut-outs on the motors, etc., are so essential that any repetition here would be superfluous. However, it is well to bear in mind that while the possibility of accident is so rare as to be unthought of, this slight attention to the details of operation will tend to give improved daily results, and at no particular cost of time or money. Frankly, I would like to have the comments of others on this, as to whether I am right in my analysis of the condition outlined.—E. S. HARVEY.

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Expert Burning-in

Repairs Scratches and Mars in the Finest Piano Finishes

by F.W. Purdon
Finishing Superintendent

ONE of the finest and most skillful operations in the whole finishing process is that which is known as "Burning In," but I wonder how many finishers realize this? How many have ever had the privilege of seeing a real artisan with the burning-in knife at work. Of course, understand there are various classes or styles of burning-in. What I have in mind is the real skilled craftsman who is able to take a scratch across the grain on the side of a finished piano, say a scratch 5-in. or 6-in. long, burn this in and finish it off without having to recoat the side or apply a patch.

With 20 years' experience in the largest piano manufacturing company in the U. S. A., and by close observation, I can say that out of every 100 men who start in to learn touching-up—which is the operation after the coarse rubbing, and the operation where a man has to learn to master the burning-in art—only about 10% of the men who start ever make a success of it, and about one out of every 100 will ever become a real artist with the burning-in knife.

It requires at least six months to a year for a man of average intelligence to learn to burn in on such work, such as pilasters, key blocks, trusses or legs—and this is on work which has just been coarse rubbed and has yet to have the flow coat applied. Then for the man to be able to burn in on the finished polished product, it takes at least from four to five years' experience with the knife.

Burning-in Equipment

No doubt, you are all familiar with the type of burning in used by many patchers in repairing: Using the colored "stick lacquer" and the electric iron; melting some of the colored "stick lacq" with the iron into the small hole and then rubbing it down with pumice stone and oil; generally leaving a well rounded hump of colored "stick lacq" where the hole was. This is just crude work and should not be in any manner connected with the type of burning in which I have in mind.

The tools used by the expert at burning in are, first, the knife. Generally the knife is a pallett knife such as is used for mixing colors by the oil artist. It is about 7-in. or 8-in. in length, with a 3-in. handle. The blade of a new knife is rounded at the

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end like a case knife; it must be ground until the blade or front is square like a putty knife, and it must be perfectly smooth so as not to leave a scratch of any kind if drawn over a polished surface of varnish or lacquer. The blades of these knives are about ½-in. to ⅝-in. wide. Some finishers prefer a real stiff blade while others prefer a slightly flexible one. Care should be used to select one that is not too flexible.

Next comes the method for heating the knife. The alcohol lamp is commonly used, but there are several electric heaters which are much to be preferred in many respects, as they lessen the danger of fire and do not explode. But when working on cases here and there, the alcohol lamp may be moved about easily and is handy . . . . but one must be careful with them, as I have known several workmen who have been severely burned from accidently kicking them over.

The next tool is the scraper. A good scraper may be made from a piece of bandsaw blade or any other good piece of steel having the same qualities. These scrapers are generally about 2-in. long and about ½-in. to ¾-in. wide, and are sharpened on both ends, using a good grade of fine oil stone or water stone similar to razor hone. It is quite a trick to properly sharpen the scraper.

Next in material is the transparent stick shellac. A good choice should be made of this material. There is a medium of texture which is just right; it must not be too hard or too soft. Again, be sure to select a grade which will polish out with a luster like the varnish or lacquer on which you are using it. I have found types of stick shellac that were impossible to polish, due chiefly to their being too soft.

Other materials which one must use are alcohol, linseed oil, colors, pencil brushes, pouncers (which are made by placing a small bunch of cotton into cheese cloth and doing it up into a tight ball about the size of an English walnut), small felt blocks for pumice stone and felt pads for rottenstone, and French varnish, which is a very highly refined grade of shellac.

Now, we must have something to work on. The foreman walks in to Bill with a top frame from a piano which must be shipped today—and any piece of work which is rush is bound to have something happen to it, and this top frame is no exception. While the fine rubbing was being done, a piece of foreign matter got mixed into the 3/F pumice stone and onto the block; one stroke and a nice big yellow scratch is into the varnish about 6-in. long. No time to recoat this piece, so Bill goes to work.

How an Expert Does It

First, with the sharp point of a pen knife blade, he carefully cleans out all particles of the injured varnish from the scratch; then he dips the point of his knife into alcohol and runs just a trifle of this into the scratch. This brings back the color along the edges of the injured varnish in the scratch. If the color of the piece has been injured, he now colors these places with spirit-soluable colors, mixing red, black, yellow, etc., until he has a perfect match. (Spirit colors dry fast for this work.)

Now, he is ready for the burn-

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ing-in knife and the transparent shellac. The knife must be heated to just a certain temperature. This is very important, because if it is too hot it will burn the stick shellac; if too cool, the knife will not melt the shellac sufficiently so it can be worked. It takes a lot of experience to learn this one very important thing—heating the knife properly. With the knife heated, he now takes off the stick of shellac by melting it onto the top of the blade, just enough to use, and with a long, quick stroke of the knife transfers the melted shellac into the ruptured finish. Then, by reheating his knife, he goes over and over this until the scratch is filled perfectly full with no air pockets left. While doing this he has taken off the excess shellac on the surface to a minimum degree, because the only part of the shellac which will be of any use is the part which has filled the scratch. Any that is spread outside of the scratch must be taken off, so if you don't put it on, you will not have the trouble of taking it off.

When he is sure the hole is packed full of shellac, with no air pockets, Bill then takes his scraper and scrapes off the shellac until it is perfectly even with the finish. Then he examines it closely to see if the scratch has been perfectly filled. If so, he now takes his small hard felt block with 3/F pumice stone and oil, and gently rubs out the fine scraper marks. Then he takes his rottenstone felt and works out the pumice stone scratches.

The top frame is now ready to go back to the polishers who hand polish the places where it has been repaired, leaving the piece in perfect condition. It is impossible to find where a scratch, jam or bruise has been repaired when the job is done by a real artist. So, the operation has taken about one-half to three-quarters of an hour and the case will be shipped on time. Bill has saved his company from having to strip the frame and refinish it, which would mean several dollars for labor and material, besides the delay in shipping.

Secrets of Success

The secret of successful work with the burning-in knife lays in being careful to clean out the scratch or bruise of all dead varnish or lacquer, filling the rupture perfectly full, leaving no small air pockets or holes—and being able to do that requires a lot of real practice of burning in on work which is to be coated. Also, a man must work at it every day just as one would practice when learning to play a violin. To lay off for any length of time is almost like having to start over again, because you lose the knack of properly heating the knife. Also, you lose the quickness required to take off the right amount of shellac on the knife and transfer it onto the scratch. One has to work fast in doing this, as the shellac cools off rapidly and once it has cooled it can not be pressed firmly into the bottom of the scratch . . . . and it is likely to leave air pockets which cause shrinkage or will pull out when one uses his scraper.

I want to caution the novice about overheating the knife and applying it on the finish. If you do this it will burn the finish and make the job much more difficult to do than before you started. The knife should be kept clean

at all times. Don't allow shellac to become burned on the knife, or the knife to become smoked, as this will discolor the shellac, spoiling the transparent quality and thereby spoiling the work.

Success with the burning-in knife comes only with practice. The novice will find that this is so many times before he becomes a real expert. Generally the novice starts out by burning the work badly; also, by using too much shellac, causing the place where the hole or scratch was to look like a wart or miniature mountain ridge. Then, when he tries to scrape off this excess shellac, he scrapes or rubs the finishing coats through around the hole, or does one of the other 100 things which will make it necessary to recoat the piece after he has tried to burn it in.

The expert with a burning-in knife can save for his company many, many times his wages by repairing scratches, jams, etc., which would have to be recoated or, in a great many cases, cleaned off entirely and refinished.

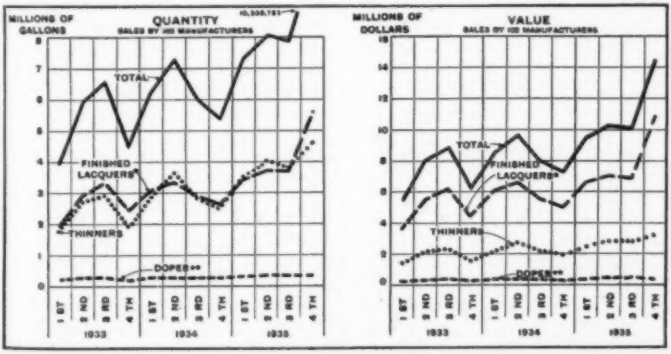
Burning in is a real art. A workman who is really good at it is priceless to his employer, for such a man is very hard to find.

Exporters' Handbook For Shipments to Europe

"Preparing Shipments to Europe," is the name of a valuable book that may be obtained at a cost of only 15 cents by writing the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any of the District Offices of the Bureau of Foreign and Domestic Commerce located in principal cities throughout the country.

It is the aim of this publication to present to American exporters in a brief and concise manner the information required to furnish him with a knowledge of the basic requirements for properly preparing and forwarding shipments to the countries of Europe. By conforming with these requirements the exporter will avoid most of the pitfalls and facilitate the delivery of his goods to their ultimate destination, according to the Commerce Department.

The material presented in the handbook, which is one of a series of country and regional studies on this subject, is based on a careful study of the original customs laws and regulations of each of the European countries, supplemented by reports from American consuls and commercial attaches abroad.



This chart, prepared and released by the Bureau of Census, U. S. Dept. of Commerce, shows statistics on the sales of clear and pigmented lacquers, lacquer bases and dopes, and thinners for 1933, '34 and '35. (Includes sales of package goods, too.)

How we decided upon What Finish to use and Who to buy it from . .

For Our Refrigerators

by M. M. Miller

How this company arrived at the selection of a finish, and how they decided upon who to supply it, is equally applicable in the selection of a finishing material for any other industrial product.

■ ■ ■ ■ ■

WHEN WE went into the manufacture of metal-covered refrigerators it was necessary that a type of finish be decided upon. Possibly the most important single point in the wearing qualities of a refrigerator is its finish, and with this in mind we went about it as follows:

First we decided to deal with responsible companies only, and those that had successful experience with problems identical or similar to ours. We felt we were too small to do a lot of experimenting and sampling, and although we might miss a worthy product we would have to take that chance for the lesser hazard involved.

Next we got recommendations from the various sources that we decided to contact. We had these recommendations follow similar lines and in a way so that all comparative qualities could be reviewed. Matters such as method of application, baking schedules, health and fire hazard, cost, durability, color, grease and light resistance, hardness, flexibility . . . all were carefully considered.

With all of this information before us, the first matter decided upon was the type of finish. With this selected the number of companies dwindled down to comparatively few. The choice of the type of finish was dependent upon the cost of the equipment and processing methods required, and also the amount of space that would be needed.

Then we got from each of the companies that were still involved, sample panels finished in their complete system, together with all of their recommendations. The panels were examined and put through comparative tests which included outdoor exposure, flexing, examination for hardness, and exposure in a humidity cabinet. At

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the outcome of these tests there were only two companies left from whom we felt we could not go far wrong in buying. Costs were pretty much in line and we decided to place an initial order with each of them and determine in actual working conditions and by actual usage which material might be better. This we did. A few weeks passed without any definite choice having been decided upon.

Just at this time several problems arose in our finishing department. One had to do with a neighbors' complaints about our spray vapors. Another concerned the determination of proper baking schedules. It was at this point that an easy choice was rendered, as to whom we felt should be the most desirable company with whom to do business.

Immediately upon learning of our troubles, one of the companies sent a thoroughly competent man to our plant. This man stayed with us long enough to instruct our men with the proper handling of his company's materials and, in fact he covered all phases of our finishing department operations, even including those that did not directly apply to the materials supplied by his company. His suggestions covering dirt, fire and health hazards and many other things were invaluable.

The other company involved wrote us several letters, but took no action other than this.

In the case of these two companies there could then be for us only one source of supply, as with everything else being equal, cooperation of the kind which we received we felt was the deciding factor, and we acted accordingly.

Franklin Research Co. Purchases Wilbur White Chemical Co.

The Franklin Research Co. of Philadelphia, Pa., manufacturers of Rubber-Gloss wax, has purchased from the Innis Spieden Co. of New York the going business of the Wilbur White Chemical Co. of Owego, N. Y. The Wilbur White Chemical Co. was a 100% owned subsidiary of the Innis Spieden Co. and has for the past nine years done extensive research work in the field of water emulsion waxes, developing and perfecting wax films as used for floors, factory finish coatings and other industrial requirements pertaining primarily to the rubber, leather, nursery, and paper industries.

The Franklin Research Co. will continue to operate the Wilbur White Chemical Co. as a division of Franklin Research Co., and they have retained Mr. W. A. Bridgeman, formerly president of the Wilbur White Chemical Co. as managing head of an industrial department which will pursue the further development and sale of special water emulsion formulas for specific industrial uses.

C. M. Rice Joins Stanley Chemical Co.

The Stanley Chemical Co. of East Berlin, Conn., announce the addition to their sales staff of Mr. Charles M. Rice, with permanent headquarters in Philadelphia.

Here's How. . .

Here's how we are able to increase the sales appeal of many products . . . Manufacturers send us a sample of their product. It goes into our creative studio for analysis. The nature of the product, its potential market, its price, its use and all other phases are considered.

From this study, the most appropriate, most practical, and most economical finish we are able to conceive is applied.

Sometimes our conception of finish actually reduces finishing costs . . . other times it increases them . . . but in nearly all cases sales-appeal is increased enough to make the change profitable.

There is no charge to reputable firms for this creative service. Will you write us about your finishing problems?

"No tampering with quality"

Rockford Varnish Co.

ROCKFORD, ILLINOIS

"Ti-Sil" Paint Pigment

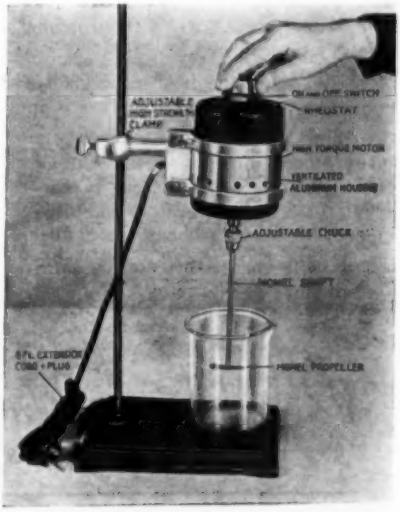
A new titanium pigment which will be sold under the trade name of "Ti-Sil" has just been announced by the Krebs Pigment & Color Corporation. This new pigment is for use in exterior white paints and, as indicated by the trade name, is a titanium-silicate base pigment.

"Ti-Sil" is a composite pigment containing approximately 30% of Krebs titanium dioxide and 70% selected and treated silicate extenders. The extenders are chosen to exhibit the best known durability for this class of material, and the ingredients are blended and ground to insure perfect uniformity.

While "Ti-Sil" provides both a prime pigment and well chosen extenders as one combination pigment, it is not intended for use as a sole pigment in exterior paint formulations.

Electric Mixer

Lab Mix Sr, as announced by the Chemical Publishing Co., 175 Fifth Ave., New York, N. Y., is a powerful, variable-speed, low-priced, non-sparking laboratory stirrer . . . . a beautiful, sturdy and well built piece of equipment useful for making emulsions; dissolving dyes, gums and resins, waxes and bitumens, pyroxylin, cellulose ethers, etc. Actuated by a shaded pole type motor, it will run 24 hours daily without damage . . . . no danger of explosion when mixing inflammable liquids . . . . speed may be varied by rheostat. It is provided with a screw clamp which fits any ring stand. The shaft and propeller are made of Monel metal. The pitch of the propeller may be changed with pliers to regulate mixing.



What's New « «

Milburn Spray Gun

The Paint Spray Equipment Division of the Alexander Milburn Co., 1436 W. Baltimore St., Baltimore, Md., announces an entirely new Type MM paint spray gun. This gun has many features which place it in a superior class of its own.

Standard air hose connection, located at the base of the handle, is designed for ease of handling and to prevent tangling of the air hose or obstructing adjustment controls.

Atomizer head is of one piece, precision machined and concentrically centered on fluid nozzle, assuring accurate alignment. Direct and com-

Save $230.00 a Year on Each Airfinishing Booth

NEW

Paasche DEVELOPMENT

A Real Self-Cleaning Airfinishing Booth That

eliminates all cleaning costs for labor and solvent; banishes fire hazards.

Paasche Self - Cleaning Booths—For Lacquer, Synthetic Enamel, Paint, Etc. —Available in Varied Sizes and Styles to Meet Your Individual Production, Finishing, and Reclaiming Requirements.

For the greater savings and greater safety, investigate this entirely new type of airfinishing booth. Possessing all the advantages of the oldstyle booth, it offers new improvements of vital importance to finishers.

Because of the Self-Cleaning Principle, all solids and dust are eliminated, only the fumes are exhausted to the outside of the building. No material, that might cause fire or explosion, is allowed to get into the sewers. PRACTICALLY EVERY FIRE HAZARD IS AVOIDED. It carries the usual Underwriters' Label and meets every safety and health requirement.

Few developments in the airfinishing field have met with a quicker response than this new Paasche Self-Cleaning Booth. Whenever its advantages have been analyzed and its savings studied, its purchase has been inevitable. Let one of our engineers demonstrate how the installation of this booth—with its self-cleaning features—will pay for itself in a single year through savings on labor and solvent cleaning costs.

Send for Bulletin A1-36.

Paasche Airbrush Co.
1917 DIVERSEY PARKWAY CHICAGO

Pioneers of Manual and Automatic Airfinishing, Aircoating, Airrubbing, Portable Airpainting Units, Airfinishing Booths, and Fireproof Ventilating Equipment.

Cleaning requires only a few seconds as every part touched by the paint is in the single unit detachable spray head.

modious air passages provide an abundant, free-flowing air supply.

Two-finger grip trigger conforms naturally to the shape of the fingers, responding to the slightest touch. Trigger works against a non-corrosive ball bearing in the end of the air valve stem, assuring frictionless operation.

The fluid nozzle is made of wear-resisting steel with internal and external tapered seats, hardened and burnished to the most exacting specifications.

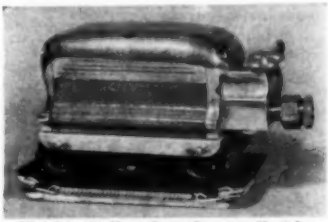
A knurled adjusting nut operates a non-corrosive needle valve to regulate air flow to the atomizer head. This controls the spray volume and the shape of the spray, whether flat or round. Another knurled nut adjusts fluid flow by means of a stainless steel needle valve. This valve is connected by a universal joint for constant alignment and easy, economical replacement of paint needle valve points. The valve is closed by a tension spring which assures perfect seating under high fluid pressures.

Fluid and air control valves are set so that when the trigger is pulled, air is first admitted into the spray head, then the fluid; when trigger is released the fluid needle valve closes first, then the air valve. This prevents weeping or spattering when the fluid is turned on.

Speed Block Sander Improved

Through constant field and laboratory research, the Sterling Products Co., Curtis Bldg., Detroit, Mich., has made major improvements which have greatly increased the usefulness of their Speed-Bloc sander, for both wet and dry sanding. Designed primarily to replace hand sanding and rubbing, its application through these new developments has been increased tremendously. The Sterling is now applicable to more curved and all flat surfaces, on metal, fabric, wood, composition or marble . . . . made possible because of ingenious redesign of the sanding pad and block.

The principle of "floating" has been applied to the block and pad. The result is an entirely new motion in that there is no restriction



Weight, 7¼ lbs. Length, overall, 7-in.

in the movement of the pad proper. Using highly flexible tubular rollers of special rubber composition between the pad and air motor to replace the former bridge construction, the contact of the abrasive surface has been increased to approximately 90%. A proportionate increase in effective abrasive area also applies to curved surfaces.

The sanding block is now made of five parts instead of one. Parts subject to greatest wear are readily and cheaply replaced. A hardened steel shoe which receives the thrust is now vulcanized integrally with the rubber bloc instead of being held by screws.

Improvements in the air motor have not only made it a smoother operating unit, but air consumption has also been decreased. Full operation is now accomplished with 50 to 60 lbs., instead of 70 lbs., and delivery of power at top of torque has been measurably increased, yet air consumption is still within original limits of slightly over 6-cu.ft. per minute.

New pistons are given anodic treatment, and leather piston cups are now ingeniously mounted to permit renewal without removing piston. Cross head and driving shaft are made of one-piece alloy steel. Double shielded ball bearings are used throughout. The motor exhaust is equipped with a silencer which further reduces vibration and keeps out dust. The oscillating stroke of the pad is ⅝-in., and the speed remains at 3,000 strokes per minute.

BEUGLER STRIPING KITS

Practicability — **Patented automatic feed and material return. No dripping.**

Accuracy — **Precision built. Stripes perfectly in any position.**

Adaptability — **For either flat or curved surfaces or routings.**

Simplicity — **Anyone can do expert striping with Beugler Stripers. They operate with any standard material.**

Durability — **Constructed of hardened stainless steel and chromium plated brass.**

Completeness — **A complete striping kit in an attractive case.**

Ten-Day, Money-Back Guarantee

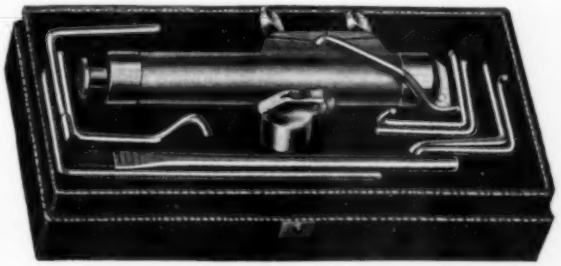
BEUGLER MFG. CO.
4318 W. 2nd St., Dept. F., Los Angeles, Calif.

DeLuxe Striping Kit.....$8.50

Three wheels, eight adjustable guides and cleaning brush. Packed in velvet lined, leatherette case. Capacity for 300 to 1,000 feet of striping. Chromium plated, brass barrel. Hardened stainless steel wheels and axles.

Craftsman Striping Kit..$4.95

Two wheels, five guides and cleaning brush. Packed in leatherette case. Slightly shorter barrel, otherwise identical with DeLuxe Kit and parts interchangeable. Designed for use where the variety of work does not require as complete a kit.



U. S. Pat. No. 1985710

WHEEL SIZES
No. 16 No. 25 No. 43 No. 73 No. 93

Coating Photographs

with protective transparent finishes . . and doing it on an economical production basis

by E. Perry

This article is an answer to a number of inquiries for suitable materials and methods for applying transparent coatings to photographs, photographic enlargements and art pictures.

TRANSPARENT oil photo colors are used for tinting photographs. The color pigments utilized are selected for their known permanency to direct sunlight, and are admixed with a considerable quantity of a very light and velvety extender to reduce the color strength to a state of clear transparency; the mixture is then ground in the oil medium to impalpable fineness. These photo colors are prepared in proper consistency and strength, and full directions for using them are furnished by the makers (name on request). Sufficient time—usually several days—must be allowed for thorough drying of the oil tinting color before varnish may be safely applied over it.

Crystal Paper Varnish

Crystal paper varnish supplied by most varnish manufacturers usually is Batavia dammar gum "cut" (dissolved) in turpentine and/or petroleum thinner. These pale varnishes are literally colorless and very glossy, but dammar is a very friable or brittle resin and therefore not durable. Drying is by evaporation of the solvent used and, although fast compared to orthodox varnishes, they are not out of dust sufficiently quick to insure flawless coatings. Very likely it was this class of varnish which is complained of by one inquirer. A faster type would be made up in the proportion of 1-lb. of Batavia dammar cut in 5 pints of acetone. One picture varnish marketed for use on photographic prints consists of dammar cut in 90% benzol (coal-tar solvent) which is very fast and requires to be sprayed on.

Lacquer

One inquirer stated that ordinary lacquer also is not satisfactory. That would very likely be so; but the special type of lacquer coating which is used on "movie" films ought to be practicable for photographs because the sensitized gelatine coating on picture films is similar to the gelatine coating on photo paper. This special lac-

WATEROIL STAINS

have won National Approval

They are fast to light, quick drying, non-bleeding and non-grain-raising. Made from water colors.

. . . also!

REAL-FILL FILLERS

There are none better. No shrinkage or lifting from pores. Clear colors.

LICENSED OR UN-LICENSED LACQUERS

A trial will disclose their exceptional merit.

LIGHT-FAST SHADING STAINS

Prevent fading and blend perfectly.

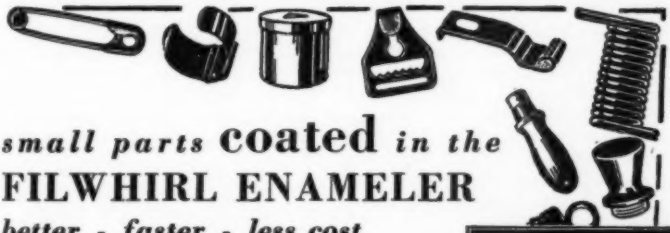
No. 1900 CLEANUP POLISH

Eliminates haze or bloom. Miscible in water.

"Unquestionable Quality"—Wood Finishing Supplies

V. J. DOLAN & COMPANY, INC.

1830-32 N. Laramie Ave. Chicago, Illinois



small parts **coated** *in the*

FILWHIRL ENAMELER

better - faster - less cost

INSPIRED to put pleasing, lasting finishes on your products, you need a Filwhirl Enameler to do the job . . better, faster and more economically. See for yourself . . send us samples of your products for coating in the machine, and we will return them for your inspection, together with cost figures, etc. Meet the challenge of competition with a FILWHIRL!

THE LEON J. BARRETT CO.

Grafton Street Worcester, Mass.

quer alluded to is used as a protective coating over only the sound strip along one margin of talking-picture films. It is composed of equal proportions of de-waxed shellac and nitro-cotton dissolved in laquer solvents and diluents. The nature of this material would necessitate applying it to pictures by spraying.

That the above type of lacquer ought to be practicable, perhaps may be signified by the fact that shellac varnish itself is already successfully used straight for gloss coating of photo prints; and because a cellulose solution used for the same work, but to produce matt finish, is made on the following recipe:

Cleaned Film Scrap	1-lb.
Amyl Acetate	½-gal.
Commercial Ether	½-gal.

The cellulose scrap specified is picture film stripped of its gelatine coating. The above solution is adaptable mainly to varnishing comparatively small size pictures, because the prints are to be completely immersed in the solution. Tongs should be used for immersing the prints, moving them around to avoid bare areas and the attachment of bubbles; then they are withdrawn and drained.

Standard Shellac Lacquer

A shellac lacquer of beautiful clarity, excellent toughness, perfect leveling, and exceptionally quick drying, may be made by dissolving 2-lbs. of de-waxed bleached shellac in one gallon of solvent composed of fusel oil 80% and methanol (wood alcohol) 20%. Fusel oil, which consists largely of amyl, butyl, and propyl alcohols, is a by-product in the manufacture of ethyl alcohol. It generally contains upwards of 15% of proof spirit (ethyl alcohol) as impurity. Fusel oil is of considerable commercial importance. The lac resin must be very dry for best results, so spread it out onto pans or otherwise to evaporate any moisture; then cut it in the solvent by agitation of the mixture as in making ordinary shellac varnish. Finally, filter through filter paper. The above has proved to be an ideal coating for commercial work along other lines by the author, and in his judgment it ought to be very well adapted also as a coating over photographs. However, it would be advisable to first test it on a colored print of no value, to ascertain if the photograph colors might be affected by the combination solvent. On account of the strong solvency of the liquid mixture, application would have to be by a spray gun set for very fine atomization.

Wax-Free Shellac Varnish

Rather than the standard grade of shellac varnish, the author advises using wax-free shellac varnish which is regularly obtainable under the name of "French Pol-

AMAZING DURABILITY

Larcoloid dries in ONE hour!

Regardless of what you have used, it will pay you to investigate

LARCOLOID

Not just because it actually resists Acids and Alkali—not just because of its amazing hardness, adhesion and durability do we recommend Larcoloid. In addition to these important qualities Larcoloid will be formulated, any lustre, to your baking specifications.

Your choice of 27 beautiful colors and, of course, black and white, or we will match your required color.

When you have a finishing problem that looks impossible—Larcoloid will make it look easy.

Learn more about this sensational finish. Your inquiry will be promptly answered.

Larkin Co Inc. PAINT DIV., Buffalo, N. Y.

Manufacturers of Enamels, Varnishes, Japans, Lacquers.

SURFACERS

PORES NEED FILLING for smooth - textured attractive finishes. Presdwood, celotex, natural woods, rough metals and porous compositions need quick-drying, easy-sanding, high-bodied surfacers—in short, our CEL-U-LAK Surfacers.

These have unusually high body, coupled with low viscosity, permitting a heavy application by spray; air dry to sand in 1½ hours, force dry at 125° for 20 minutes. They are ground finely and have phenomenal adhesion and resistance to moisture.

CEL - U - LAK Surfacers are standard in white, ivory, dark grey and red. They have for 6 years been an outstanding successful item in our line. We suggest you examine it for your requirements.

The VARNISH PRODUCTS CO.

CLEVELAND, OHIO

ish," because the absence of colloidal or suspended wax will insure greater transparency and depth in the coating applied over the photographs. On the other hand, regular shellac containing its natural wax would show luster slightly less sharp, and oftentimes that feature must be considered.

The only known way to produce a dull shellac would be to add some foreign substance, and so far that has not yet been done practicably. Of course, a thin coat of shellac will produce less gloss than a heavier coating, and the gloss becomes less as time goes on. Admixture of cellulose solutions (as of film scrap) to shellac effect some slight dulling of the gloss, but the faster evaporation of the liquid in those solutions causes too much "blushing" under slightly humid conditions during application and drying. Shellac varnish is usually thinned about 50% (1 gallon of shellac plus ½ gallon of alcohol) which reduces a 4-lb. cut to about a 2½-lb. cut, or a little more. Rapid evaporating of the alcohol in shellac varnish will cause condensation of moisture unless due precaution is exercised at the time of applying the varnish. Exclude moist air by closing all windows and doors, and make sure that the surfaces to be coated are thoroughly dry.

Pieced-Up Enlargements for Murals

During the past two years there has come into vogue the utilizing of large photographs in the same manner as mural decoration in public halls, lobbies, etc. Notable examples of this new art are Edward Steichen's photo murals in the RKO-Roxy Theatre in Radio City and also in the New York State Building of the "Century of Progress" in Chicago. The making of these murals was no simple task, and barrels of wasted bromide paper was an unavoidable loss before the mammoth strips, reasonably perfect, were produced. The Roxy mural is approximately 7-ft. high by 150-ft. long, and the Chicago murals are 16x140-ft. To fully describe the construction of pictures of such heroic size would be outside the scope of this magazine, but the following brief explanation should suffice:

First, hundreds of 8x10-in. photographs were taken by Mr. Steichen, and from these he contrived the photo-montage which means that he cut parts of the photographs and pasted them together to form a continuous picture of suitable composition. He then turned over the long strip of photo-montage to the well-known Apeda Studios in New York where the enlargements were executed on bromide paper 40-in. wide and 7-ft. long. When all of the sections were completed, the assembling of the mural was begun. Expert paperhangers first covered the plaster wall with cheesecloth, and while wet the photographic enlargements were cemented on. The paste used had to be free of any harmful ingredients which might possibly penetrate the paper and affect the gelatine emulsion of the pictures.

Following this, an expert airbrushman had to uniform or tone together the adjoining sections in much the same manner as uniforming stain is used in furniture finishing. Finally, the whole ensemble was varnished for protection against air and dirt. A good spar varnish was sprayed on evenly. Here is another case where the

(Continued on page 61)

Letters from Readers of "Industrial Finishing"

The names and addresses of firms or individuals whose letters and inquiries appear in this department may be had by writing this office, or letters addressed to them in care of this office will be forwarded promptly.—The Editor.

Rubber Finish on Metal

We would appreciate your advising us if there is a product you know of for spraying or dipping a rubber finish on metal. Any information you can give us as to manufacturer or distributor will be greatly appreciated.—G. H. Co. (Commercial Finishers).

Small Spray Outfit

We are interested in purchasing a portable spray outfit consisting of a gun and compressor unit for small work, for around $50. If any of your advertisers make small outfits like the above, we would appreciate your putting them in touch with us.—C. Mfg. Co. (Radio and Sound Transmission Equipment).

Pearl Essence

In your December, 1935 issue, you mention that a manufacturer of pearl essence says that a pearl essence can be used with bases other than lacquer. Since we are very much interested in pearl essence, which we are supplying to the English market, we would like to know the name of the manufacturer in question, so that we can approach him with a view to securing supplies.—Scott Bader & Co. Ltd., 109, Kingsway, London, W. C. 2, ENGLAND.

Flexible Finish for Metal

In your January issue you mention a flexible lacquer for metal. . . . If this finish will do what you say it will it has, I think, answered my problem. We manufacture a truck mirror. I finish the shell and arm separate, and then the two pieces are sent to the punch press department where they close the mirror in a closing die. This is somewhat of a severe bend. At the present time we are using a black baking japan and it does not work out as we would like to have it. A lot of it chips.

I would appreciate it if you would furnish me with the name of the company that manufactures this flexible lacquer.—B. E. C.

For Floor Linoleum

I am interested in some kind of coating which I can apply on office floor linoleum which is beginning to wear and crack. Perhaps the "Rub-it-on" varnish mentioned on page 42 of January issue of INDUSTRIAL FINISHING will answer the purpose. If so, kindly advise the manufacturer of this varnish.—J. A. E.

Opalescent Finish for Automobiles

Some years ago there was put on the market, and used principally on automobiles, a type of paint known primarily, we believe, by the name of polychromatic finish, although it was probably also known by other names, such as iridescent, luminescent and opalescent.

We would like to get some information as to the use of this type of paint, particularly on automobiles, the names of the concerns who manufacture it, and if possible, the names of the automobile companies using this type of paint.

We are, however, primarily inter-

ested, as far as possible, in the dates when this finish was first put on the market, and an estimate of the total amount of this new finish as compared with standard Duco or other lacquers used for automobiles.

Perhaps you can give us all or part of this information, or refer us to some articles that might have been published concerning it. Any details you can give us will be appreciated. —J. T. D. Co.

Refinishing Materials

Recently I was fortunate enough to receive, from a furniture manufacturing concern, a copy of INDUSTRIAL FINISHING dated January 1935. In it I found many items which were of great interest to me. My business is repairing furniture—new, antique and old. I have often encountered problems which I solved as best I could with much difficulty. In the above mentioned magazine I found descriptions of materials which would be very useful to me if I knew where to buy them. I have tried in several paint stores but they do not seem to carry them. I wish to know if you can supply me with the names and addresses of either the distributors or manufacturers of these products . . . . —C. L.

Oil Stains Bleed?

In looking over your January edition, our attention was called to your review of new finishes—uniforming oil stain and pigment oil stain. It has always been our experience with the oil type of stain that we could not eliminate bleeding under sealer or lacquer. If the manufacturers of these stains have taken that into consideration and have been able to overcome it, we would very much like to have the names of these manufacturers.—T. J. Co. (Plumbers' Woodwork).

Two-Color Handle Finishing

At the present time we have a problem that we have not solved to our satisfaction. . . . We use a two-color finish on a number of our better grade handles for all kinds of hammers, and at the middle point of the handle, where the two colors meet, we put on a decalcomania label. This label gives us a very neat effect and allows us to display our name and the quality of tool, but it has a number of disadvantages which we are very anxious to overcome. Among these are a rapid peeling off or chipping very shortly after the hammer is put into use, with a resulting unfinished appearance where the two colors meet.

On this account we would like to develop a new kind of band to cover up this juncture point, such as a strip of paint or lacquer, a series of fine burnt in lines, perhaps a more permanent label, or a refinement of our present dipping process. You will readily understand the operation must produce a pleasing effect, at a reasonable cost.

I would suggest that should you be able to devise some method of improving our process, which would require the service or material of some outside firm, that you write us first so that we may have an opportunity of communicating with you regarding it. We will certainly welcome any assistance you may be able to give us.—W. & C. Co. (Makers of Fine Tools).

Baking Ovens

We are contemplating the installation of more uptodate baking ovens than we now have. What we are really interested in is a baking oven in which the material could be placed and delivered at the other end in 30 to 35 minutes.

The articles we bake are small spools, the largest of which are approximately 2¾-in. in diameter by 2-in. in width. We do not know of anything on the market of this nature but if you know of anything, we would appreciate a line from you. —G. M. Box Co. (Chests, Cabinets).

Golf Ball Painting

I am seeking advice on golf ball repainting. I wish to reproduce a factory finish and would like to know what equipment, material and method to use. If you can advise me concerning this, or refer me to the proper source, I will appreciate your courtesy and consideration.—C. J. Z.

Cotton, Rayon Flock

Would you please furnish us names and addresses of all the manufacturers of cotton, rayon and wool flocks that you may have knowledge of? We are interested in dealing direct with manufacturers only, and would appreciate receiving this information as soon as possible.—T. H. & T. Co. (Distributors of Spray Painting Equipment).

Have You Tried

Leolac Perfectly Balanced Lacquers and Leosyn Rapid Drying Synthetics

manufactured under the technical supervision of L. S. Finch who has been formulating lacquers since 1923. We suggest wood finishers try SANDING WOOD LACQUER No. 66 and LACQUER THINNER No. 15.

Samples and Color Cards Sent on Request.

LEON FINCH, LTD.

Office and Factory
750 EAST 59TH STREET
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1331 HOWARD STREET
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SILK SCREEN METHODS of REPRODUCTION

Fully Illustrated by the Author. Leatherette Binding. Size 5x7½ in. 160 Pages. 87 Illustrations (Some in color.) Boxed..... $3.00

THIS new book is intended for Sign Painters, Card Writers, Display Men, Furniture Manufacturers, Novelty Manufacturers, Glass Etchers and For Domestic Use.

Every detail of the silk screen process is presented clearly in detail. All equipment is fully described and its use illustrated. All materials needed in the various kinds of silk screen work are mentioned with respect to their use to advantage. Estimates of costs and prices to charge are given.

Practical Publications, Inc.
222 East Ohio Street Indianapolis, Ind.

For Finisher's Hands

Kindly advise the name of the manufacturer of a material that can be rubbed into the hands and which will protect them from the effects of various rubbing materials, such as stains, oils, etc. Some time ago someone sent us a sample of this material, but a record of the manufacturer was never made, and we now find that we are in urgent need of some kind of material which will have the above mentioned results.—S. G. Co. (Artistic Wood Products).

EDITOR'S NOTE: Names and addresses of the manufacturers of Hand Save, Lakeroff Liquid Soap, Protek, Skin-Gard, Wham, etc., etc., have been supplied to this inquirer.

Finishers' Supplies

Kindly advise where we can purchase the following supplies: Burnt sienna, burnt umber, raw sienna in powder form, linseed oil in barrel lots. Will appreciate this information.—D. E. Co. (Furniture).

Dipping Machines

We note on page 13 of your January issue an illustration of an automatic dipping machine in operation. We would like to know where these dipping machines can be bought.

Also, on page 42, an article concerning baking lacquer to withstand chromium plating operation. Will you please advise where this material can be purchased, and what colors are regularly made?—S. C. Co. (Spray Equipment).

In your January issue of INDUSTRIAL FINISHING, we are very much interested in the article "Dip Finish Wood Turnings." We would like to know more about the automatic dipping machine which is spoken of in this article, and would appreciate being put in touch with the manufacturers.—P. R. Co. (Reed Furniture).

We have a customer who is interested in dipping small wooden toys in both lacquer enamels and quick-drying, air-drying enamels. Our customer has requested us to suggest the names of manufacturers of dipping machinery for this purpose.

Having at various times seen advertisements in your magazine mentioning various finishing machinery, I am wondering whether or not you would supply me with the names of two or three manufacturers of dipping machines that could be used by our customer in dipping the small wooden toys.—R. F. Co. (Industrial Research Laboratories).

Striping Tool

We believe that in one of your issues of INDUSTRIAL FINISHING we noticed an advertisement that described a tool for drawing a fine line with either ink, paint or lacquer. We wish to obtain some tool by which we can stripe cork and slate with a fine line, and thought perhaps it would be possible for you to give us the address of some manufacturer who makes a tool of this type . . . .—F. F. Co. (Materials for the Graphic Display of Facts and Figures).

To Mask Hardware

Will you please advise me if there is something new on the market to put on metal handles and hardware before spraying same so that after being sprayed the coating can be readily peeled off the handles or other hardware? I prefer to avoid using vaseline or paper and masking tape. It seems to me I have heard of a liquid which can be put on such articles before spraying the surface to which they are attached, and afterward it can be peeled off like thin rubber or cellophane.—W. H. M.

Black Finish For Brass Pencil Bands

Our company has been using black enamel on mechanical pencils since the year 1898, and we have always had plenty of grief with the enameling we have had done for us up to this time. I will endeavor to explain how we use this enamel—and am enclosing a blotter which shows how the finished pencils look with the black enamel bands, in contrast to the rolled gold-filled metal.

Our process has been as follows: First we draw a brass tube very thin and hard in temper. In fact the brass used on the pencil shown is .295-in. in diameter and has a .0075-in. wall. Second, we cut the long pieces of brass tubing into 24-in. lengths. Third, we clean all grease and dirt from the brass and carefully wrap it up in tissue to be sent to a job shop enameler. Fourth, the enameler claims he cleans these

brass tubes and then sprays on the enamel which, later, he bakes.

Fifth, when I get the tubes back from the enameler, I proceed to cut them into lengths of ½-in. and 3/32-in., but find that in about every lot, the enamel chips or powders off in some spots and stays on OK in others, but I don't dare trust any of it.

I have tried different enamelers until I am at my wits end trying to get an enamel that will stay on. Through your magazine I thought sure I had the trouble licked when about a year ago I saw a dandy flexible lacquer advertisement. I wrote the company about their enamel; their salesmen called on us and since that time I have had my enameler use their enamel. I have had fair results but have never got away wholly from chipping. One lot will come fair and the next lot I am unable to cut without 75% waste.

Now your January issue of this year is at hand and I find there are several concerns making enamels, synthetic or lacquer, which they claim will not chip, and will stay flexible. The process which seems best, if it would take on brass, probably would be the chemical black. Is it possible to use this on brass if it were plated or treated with some solution first? . . . .

To sum it all up I am in a fog on what to try next, but still think my trouble can be beaten, although I have lost faith in all these enamelers running job shops. I will appreciate any suggestions you may have . . . . —B. E. A.

To Reproduce Genuine Hardwood Grain

We are interested in the process of reproducing the grain of hardwood on metal caskets, and we shall appreciate any assistance that you may offer in enabling us to obtain information regarding this.—J. K. N. Co. (Mfrs. of Caskets).

In your January issue on page 6, we note an inquiry from one of your readers who is interested in wood grain reproduction for use on furniture. Their inquiry is signed with the initials, "N. T. R."

We would greatly appreciate your passing on to these people the information that we manufacture reproductions of various wood grains and also marbles which are suitable for use on furniture panels, whether the surface be metal, wood, or a composition such as Masonite. Our reproductions can also be applied to small novelty items.

The reproductions are authentic

Manufacturers of:

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- Has wide use and varied application. Is now being used effectively over a wrinkle finish to enhance its decorative appearance.

Chart showing full line of colors or a finished sample will be sent on request.

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The Jetal process colors iron or steel at low temperature, *by immersion*, to a uniform and brilliant black. It is a complete finish in itself, and will not chip, scale, peel or discolor — also an excellent bond for subsequent finishes that require high temperatures. Ask for circular and send samples to be JETALized.

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SIZES: ¾ inch to 36 inches wide in 60-yard rolls
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NEW BRUNSWICK, N. J.

and the application is very simple, and if your inquirer will get in touch with us we will furnish him with all of the necessary information as to cost, methods of application, etc.—The Meyercord Co.,

Striping Tools

Seems to me that I saw in your journal ads of striping tools, but I've looked over my files for the past year or more and I can't find a one. The only explanation is that it was some other journal or else those fellows have quit advertising. Anyway, if possible, send me the names of manufacturers of such tools, if you please . . . . —S. A. H. (Low-Priced, Metal Merchandise).

Buying Aluminum Finishes

Certain questions have come up in connection with the buying of aluminum finishes . . . what percentage of the volume used by industrial manufacturers is purchased direct from the paint maker, and what percent from the mill supply jobbers?—E. A. D.

Monsanto Chemical Expansion

Edgar M. Queeny, President of Monsato Chemical Co., announced today that contracts had been entered into, which provide for its acquisition of Thomas & Hochwalt Laboratories of Dayton, Ohio, and its subsidiary, the Dayton Synthetic Chemicals, Inc. Monsanto thus acquires the only outstanding minority interest in its controlled subsidiary, Monsanto Petroleum Chemicals, Inc. The latter company, which is in the research and development stage, has carried on its research work in the laboratories of Thomas & Hochwalt. The laboratories will be known as the Thomas & Hochwalt Laboratories Division of Monsanto Chemical Company, and will continue under the direction of Dr. Charles A. Thomas and Dr. Carroll A. Hochwalt.

Ti-Dox . . . Titanium Dioxide

The Krebs Pigment & Color Corporation, which has manufactured and sold Titanium Dioxide for the last several years without designating it by a trade name, announces that it will now be known as "Ti-Dox." It is announced by the company that there will be no change in the uniformly high quality of the product. Address, Newark, N. J.

Lacquer vs. Synthetics

(Continued from page 8)

might ensue. Manufacturers are reluctant to investigate or justify complaints caused by the use of foreign materials which have been employed in the interest of economy.

Relationship of Physical Properties of Thinners

In the event that the spray shop still wishes to formulate its own thinners, the following should be kept in mind: When comparing petroleum thinners within any one series, it will be noted that the higher the solvent power, the lower the viscosity effect on the synthetic. Also, an increase in solvent power is usually accompanied by an increase in the evaporation time, and by a higher boiling range and darker color. There also appears to exist a relationship between specific gravity and evaporation rate, although the writer has not yet confirmed this in his laboratory. Such important factors and relationships should be kept in the minds of formulators and purchasers, so they will not be sacrificing desirable properties in general, in an effort to get outstanding characteristics when evaluated by any particular test. This condition exposes the fallacy of specifications which seem to have so many loop holes.

Rubbing and Polishing Synthetics

Mention has been made of the lack of ability of synthetics (especially the alkyds) to be rubbed or polished. This, as most spraymen should realize, is due to the fact that synthetics have a comparatively soft finish as related to

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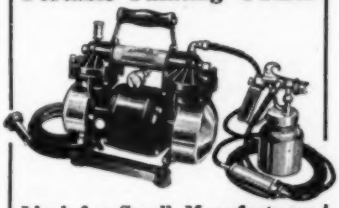

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To improve metal products
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FINISHING METAL PRODUCTS
337 pages, 6x9, illustrated, $3.50
BESIDES fully describing modern shop technique, this book coordinates metal finishing processes and finishing problems with the over-all problem of manufacture. The usual types of finish, such as galvanizing, polishing, plating, lacquering, and painting are thoroughly treated, as well as many new finishes of a specialized nature. An important feature of the book is the section on cleaning and descaling. Throughout, both technical and commercial aspects are considered in detail in an endeavor to point the way to more attractive metal finishes and to more efficient means of producing them.
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lacquers for automotive use. In other words, the harder and tougher the film, the more capable it is to being rubbed, resulting in the desired "depth of finish." Lacquers usually reach their ultimate hardness (unless plasticized with an oxidizing type of plasticizer) soon after application, whereas the hardening process of synthetics is slow and progressive, and may not reach its maximum until several weeks after the film has formed and dried dust-free.

It is true that the suppliers of the synthetic resins are able to increase the hardness of the resins to a point where the finished product may be rubbed, but unfortunately this can only be accomplished by sacrificing exterior durability (weather resistance) and other physical properties. Nevertheless, synthetics have gained a strong foothold in the industrial sales market, and although lacquers always will be used in appreciable quantities as an interior finish, the future offers an extensive market . . . . in favor of synthetics.

Japanese Book of Celluloid and Other Plastics

The first edition of "Nippon Celluloid & Other Plastics Year Book for 1936" has been published by The Nippon Celluloid Jihosha (Review). It is an illustrated book of about 250 pages, 5¾x8-in., substantially bound between stiff red cloth covers lettered in gold. Quoting from a foreword by R. Sekido, President:

"We, as publishers and writers, have the honor to express thanks to our Plastics Journals' friends in various countries—Britain, U. S. A., Germany, Italy, Australia and Russia. These publications have helped us very much in enriching the contents of our work. In the present Plastics industry of Japan, celluloid work is the center of its products, being surrounded with synthetic resins, casein plastics and others.

Coating Photographs

(Continued from page 50)

finishing material is too slow, as it would not be possible with spar varnish to avoid contamination by dust circulating in the air. Drying in four hours would be fast for spar varnish, and about the fastest possible time would be two hours. Spar varnishes should withstand outside weathering conditions, and indoors they would be practically imperishable, but aside from this feature of durability they are hardly to be recommended for photograph finishing.

Glossy Varnished Labels

Spirit varnishes are regularly used for producing the glossy "varnished" labels for cans and cartons, etc., so generally used on practically all canned food products where the packages are not otherwise lithographed. Typical goods of this character is a cold-cutting of Pontianak resin in alcohol, about 6½-lbs. of the gum to each gallon of alcohol used. It is quite heavy body, standard at about 20° Baume, weighs about 7¾-lbs. per gallon, and is reduced with alcohol by the user.

The large printed label sheets are fed into a machine similar to a printing press wherein the varnish is applied in a uniformly thin film by roller; thence the sheets travel through a heated drier which quickly vaporizes the solvent from the coating and hardens same so that the stacked label sheets do not stick together. This forced-drying is accomplished within a very few seconds of time. Labels finished in this manner withstand submersion several days in water. This material and the process of application ought to be practicable and equally as satisfactory for coating photographic prints as for label work. Possibly some label concerns might do commercial work such as varnishing large photographic prints, for outside trade.

The application of resin solutions reverts to a coating or deposit of the resin itself. None of the resins utilized for this purpose possess any degree of toughness therefore, should greater flexibility be desired, the addition of some plasticiser is resorted to. In the case of spirit label varnish already described the best plasticiser is an addition of 5% by volume of pale oleic acid. This additive imparts considerable flexibility and smoothness to the varnish film, but equally lessens the water-resistance of same. With spirit varnishes it is always advisable to use thin "cuts," or to reduce goods of normal body, because heavy solutions give films that retain solvent if subjected to only air drying. On this account, and everything else considered, the author would urge having the finishing done if possible by label makers equipped as already explained.

American-made toys are gaining in popularity abroad. Exports in 1935 amounted to about 38% more than the previous year. Canada and England are the leading buyers.

Invisible Caster

It is called invisible because you can't see it—unless you turn the furniture feet side up. A ball-bearing swivel caster operates inside the dark bronze bell-shaped steel shell of a member that readily fits the bottom end of furniture feet and which appears to be the lower part of the furniture leg. It's claimed to be noiseless, non-rusting, heavy duty, and to have long life. Write Vervoort Specialties Corp., Falconer, N. Y.

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EDITORIAL

Appearance Counts

The automobile has done more than any other kind of merchandise to convince manufacturers that "appearance counts." Most people don't think primarily about engineering questions when buying automobiles. They buy the automobile that looks best. People take it for granted that the car of their choice will run. The progress that has been made in the manufacture of articles of improved appearance is being shown in various expositions. The sales value of appearance is particularly emphasized when selling the "middle-income group." Recent experience demonstrates the fact that beauty and utility are now determining factors in the minds of all types of consumers.

Sutter's Gold

"SUTTER'S GOLD," a rich glamorous hue recalling the colorful days of the discovery of gold in California, has been created for the forthcoming Universal motion picture, "SUTTER'S GOLD." This stirring film drama revolves about General John Sutter who built Sutter's Fort at Sacramento and on whose domain gold was discovered in 1848.

This gleaming yellow gold tone will have wide promotion throughout the fashion industries as it interprets one of the outstanding color movements here and in Paris. Radiant as the gleaming nuggets coveted by the Forty Niners, it will be extensively promoted by stores throughout the country prior to the release of the film and during its showing. Costumes and accessories in this glowing hue will be widely featured in window displays and Spring fashion shows.

Airproofing the Finishing Room

The several articles published in INDUSTRIAL FINISHING about air-conditioning finish rooms have prompted one of our friends to suggest a new air-tight, watertight copper lining for floors, walls and ceilings. He says:

"A new waterproof floor lining process utilizes copper sheets produced by the Anaconda Copper Mining Co. The lining is joined with a

special solder, and can form a nearly air-tight enclosure.

"Those interested in the construction of air-conditioned finishing rooms might like to investigate the extent to which such lining would prevent the escape of too much expensive conditioned air, curtail the eddying of currents in walls and stirring up of dust, stop the entrance of dust through openings when the air conditioner is shut off, and in general maintain more favorable conditions.

"The new copper lining, which is just being placed on the market by American Rubber Products Corp., weighs 2-oz. to the square foot and is .0027-in. thick . . . produced in the Anaconda process of depositing the copper sheet on a lead-covered drum by means of electrolysis . . . CopRoll is the name of the new material. It is delivered in 100-foot lengths, 30-in. wide; 250-sq.ft. in a roll about 5-in. in diameter. A special adhesive and white metal wire are used for joining the edges. The joint is made by placing the wire between the overlap and fusing it by running an ordinary electric pressing iron over the joint."

We might add that aluminum foil can also be used for this purpose, with the additional advantage that it offers excellent insulation against excessive heat or cold that may prevail outside the room so insulated.

Retail Sales Up 14%

Total retail sales are estimated to have gained 14% in 1935 over 1934, reaching a grand total of $32,600,000,000, which is two-thirds of the total retail sales volume of 1929, as reported by the Bureau of the Census for that year. The largest gains in sales during 1935 over 1934 were represented by catalog business of mail-order houses (26%), and automotive dealers (25%). The placing of 1936 models on the market earlier than usual last year, no doubt, accounts in part for the increase in new automobile sales in 1935.

Other notable increases in 1935 over 1934 were enjoyed by the furniture and household group (21%), the lumber, building, and hardware group (20%), restaurants (18%) and jewelry stores (15%).

Popular in New York Lamps; Chairs

From one of our New York City correspondents comes the following:

Lamp shades are bell shaped, modified in one way or another, on almost every lamp seen in the metropolitan district of New York City. There is almost no demand for the once popular tambourine-like shades with fringe. Four of the smartest colors are: Rust, tan, gold and eggshell. Table and floor lamps are seen in maple, some having a shelf attached for smoking accessories. Some shades are in white or natural homespun.

The candlestick lamp is in demand for Early American interiors and although increased in scale, they faithfully follow the well-proportioned moldings of the old "sticks." They appear in walnut, maple and other woods, but largely in brass finish—brightly polished, dull and antique mottled.

Several new chairs of the tubular metal type have gained much in their finish by avoiding the brilliance of brightly polished chromium, receiving instead a satiny sanded finish. Sanded metal has a silk-like glow and at the same time has a craftsman appearance which has been increased by the use of natural finished maple trimmings, and strips of leather in some instances. One new chair, I notice, has a

back and seat of maple slats; another uses a fabric seat stretched on, with maple arm rests.

Maple wood is being used considerably, and in the natural or light honey shade, not the red finish that is now taboo for the best homes. This also is in keeping with the popular Early American style, or peasant style.

There is a decided demand in the Eastern market for furniture specialties such as end tables, breakfast nook sets, and other of the smaller furniture items.

Inquiries for Materials in January Review Number

How many inquiries came in for materials listed in the "Major Review of Developments" published in January issue; or rather which materials rated inquiries and how many, over a certain period of time? Below is a list compiled from letters that came in during the first 30 days following delivery of the magazine to readers. More are coming in, but in diminishing numbers of course.

In fact, judging from experience during previous years, inquiries for materials listed in the January Review of Developments will continue to come in all through 1936, and on into 1937.

Baking Lacquer to Withstand Chromium Plating Operation	11
Copper Paint	10
Lacquer Burning-in Cement	7
Hammered Silver, Specialty Finish	6
Jetal Process (Chemical Black)	6
Lacquer That Stretches	6
Burnished Finish	5
Horn Porceline Patch	5
Picklett	5
Super Wood Bleach	5
Temp-Urd Wood Process	5
Tonetex Wrinkle Finish	5
Aluminum Paint No. 2301	4
Bentex	4
Chrome Plate Coating	4
Clear Chromium Primer No. 6044	4
Cromodizing Rustproof	4
Dipping Aluminum	4
Filloid, Non-Absorbent Surfacer	4
Puritan Goldichrome	4
Silver Gray Synchrome Lacquer	4
Sur-Mac	4
Benite	3
Clear Glazing Finish	3
Cophane	3
Heat-Proof Aluminum	3
Non-Poisonous Color Enamel	3
Non-Poisonous Toy Enamels	3
Superflex Leather Clear Lacquer No. 20914	3
Arcozon Flexo	2
Banbo Black (for Metal)	2
Cablo Arcozon	2
Clear Bronzing Lacquer No. 6397	2
Clear Topcoat Lacquer	2
Electro-granodizing	2
Impervious Films	2
L-Mac-E Nu-Tipe Uniforming Oil Stains	2
One-Coat Wood Enamel	2
Permanent Pigment Oil Stains	2
Shellacol	2
Toy Dipping Lacquer	2
Velvet Aluminum Lacquer No. 1986	2
Waterlox Transparent	2
Waterlox Water Repellant	2
Bar-Top Lacquer	1
Benton Gray	1
B. F. P. Synthetic Enamel	1
Chem-o-Lith Solvent	1
Chem-o-Lith Process No. 404	1
Clix Finishes	1
C & O Uniforming Oil Stain	1
Dinette & Breakfast Suite Finishes	1
Dipping and Baking Aluminum Vehicle	1
Dum Dum Masonoc	1
Finish for Hard Rubber	1
Hercosol No. 80	1
Liquid Rubber Coating	1
Lithiceal (Any Color)	1
Lithocrome Finishes	1
Lithoform	1
Markal	1

M. D. Luminous Paste	1
Metal Radio-Tube Coating	1
Methyl Lactate	1
Mod Var Bar-Top Varnish	1
Mogul 3-Way Coating	1
Pigment Glazing Colors	1
Primer for Terne-Coated Sheet Steel, Zinc & Die Castings	1
Process Paints	1
Refrigerator White, Synthetic	1
Rub-it-on Varnish	1
Ruf Kast Finish	1
Synthetic White Baking Enamel	1
Topcoat Crystal Lacquer	1
Toy Enamels, One Coat for Metal or Wood	1
Tributyl Citrate	1
Tributyl Phosphate	1
Triple Life	1
Tumbling Lacquers	1
Tru-Tone Wiping Glaze	1
Vit-Re-Pair	1
TOTAL	204

More and more readers use the January Annual Review number as a quick reference on what's new in materials and to search for whatever they can find that may offer a solution for certain specific troubles, problems or propositions which have appeared or which may arise in connection with their industrial experience.

Exchange Experiences

Groups of professional and business people who make it a point to exchange experiences, facts and ideas, progress much faster than those who selfishly hold back—making no contributions or visits, and welcoming none. While many right-minded men identified with industrial finishing operations haven't much opportunity to visit the workshops of others in their line, they do have access to the trade magazine in their field. Here is a splendid medium for the exchange of experiences, facts and ideas. Read what others have to say, but do not stop at that. Say something yourself. Write to the advertiser whose product inter-

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Merrimac Chemical to Continue

In order to simplify its capital structure, Monsanto Chemical Co. of St. Louis, Mo., is proceeding to liquidate several of its wholly owned subsidiaries. The Merrimac Chemical Co. of Everett, Mass., however, will not be liquidated, and will continue to operate as heretofore.

Industrial Washing Machine Corporation

The above named concern, located at New Brunswick, N. J., has been recently formed to cover the field of washing, rinsing and drying machines for the metal industry. Mr. Ryan Sadwith, who is vice president of Ross Industries Corporation and in charge of manufacturing in their Sadwith-Waldron plant, is president of this company. H. H. Ball, secretary of the new company, has had many years' experience as a sales engineer for this type of equipment, and will be in charge of designing and sales.

"Steelcote Finishes" Bulletin

A new 4-page bulletin, prepared by Steelcote Mfg. Co., 3418 Gratiot St., St. Louis, Mo., gives important information about three outstanding Steelcote spray finishes — Lak-A-Namel, Super-X, and Steelcote Spraying Lacquer—and shows color

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Color-plating Aluminum

The second of two electroplating tanks, stated to be the largest of their kind ever built, has been recently designed and manufactured by Gross Engineering Corp., 2163 W. 105th St., Cleveland, Ohio, for an Evansville, Ind., firm. This tank is to be used in connection with the "alumilite" process of producing colored finishes on large aluminum automobile body stampings without the aid of paint or varnish. It is 38-ft. long, 6½-ft. wide and 4½-ft. deep. In order to maintain the alumilite solution at the proper temperature a double-bottomed water-jacket containing 300-ft. of lead steam piping is provided between the inner and outer shells. All parts exposed to the corroding effect of the solution are either lead or lead-coated by the Gross "leadhesion" process. The outer tank is of lead-coated steel plates, and the inner one is of heavy-gauge lead sheets supported on a strong wire mesh. The fume-removal system consists of a slotted hood surrounding the upper part of the tank just above the solution level.

Exceptional Opportunity for Industrial Finish Salesman

An important position is open for salesman of industrial finishes with leading manufacturer of quality Paints, Enamels, and Varnishes.

We are interested in a man with an established following, who has sold and is now selling production finishes to the automotive trade, to manufacturers of refrigerators, washing machines, or any other large users of industrial finishes.

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This job will appeal to the experienced successful sales representative, who is now employed but who wishes to change to a position with exceptional opportunities.

Only men of unusual ability with experience in the industrial finishing field, with good contacts and desirable accounts, will be considered.

Give full history, including experience, age, former connections, in first letter. Our salesmen have seen this advertisement.

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Qualified to direct and work with salesmen. Twenty years' experience sales and managing in ten Western states. Interested in proposition work with salesmen opening new accounts. Fully experienced in all lines paint business. Remuneration to be based on results. Address IF-600, care Industrial Finishing.

INDUSTRIAL SALESMAN

High-grade experienced man with active volume accounts in New England desires change. Only reputable concerns considered. Address IF-604, care Industrial Finishing.

EXPERIENCED FURNITURE FINISHER

Wanted by Chicago manufacturer to take charge. Replies treated confidentially. Address IF-602, care Industrial Finishing.

SALESMAN WANTED

By Eastern industrial manufacturer of Synthetics, Varnish, Oil Enamels, Primers and Lacquers. If you can sell $600 weekly, your weekly check will be $110 plus 12% commission over $600 weekly sales. Some good territories open. Give full details in your answer. Address IF-603, care Industrial Finishing.

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Lowest prices. Splendid construction — efficient exhaust. 3-ft., $60; 4-ft., $70; 6-ft., $95. Satisfaction guaranteed. INDUSTRIAL EQUIPMENT CO., 625 W. Jackson blvd., Chicago.

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